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ABSTRACT

The purpose of this manual is to suggest strategies for identifying components that must be addressed to create and develop a successful food service and nutrition facility. It focuses on the process involved in creating such facilities, and it provides an overview of the planning phase, design and construction, and educational specifications. When designing school dining, serving, and kitchen areas, it is recommended that planners pay attention to adjacency considerations and activities, dining environment, meal periods and seating requirements, stocking considerations, serving areas, and kitchen areas. Five prototypical kitchen and serving area plans and equipment schedules are introduced, including high school food courts, as well as models for elementary and middle schools. Equipment is an important component of any design program, and advice on equipment selection, receiving equipment, storage equipment, preparation equipment, mobile equipment, serving line equipment, sanitation equipment, and ventilation equipment are provided. General design considerations, along with site design and regulatory considerations for school food, are detailed. Area guidelines for determining space requirements for the five prototypical food service program designs are also featured. (RJM)

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MARYLAND STATE DEPARTMENT OF EDUCATION

SCHOOL FOOD AND NUTRITION SERVICE

DESIGN MANUAL

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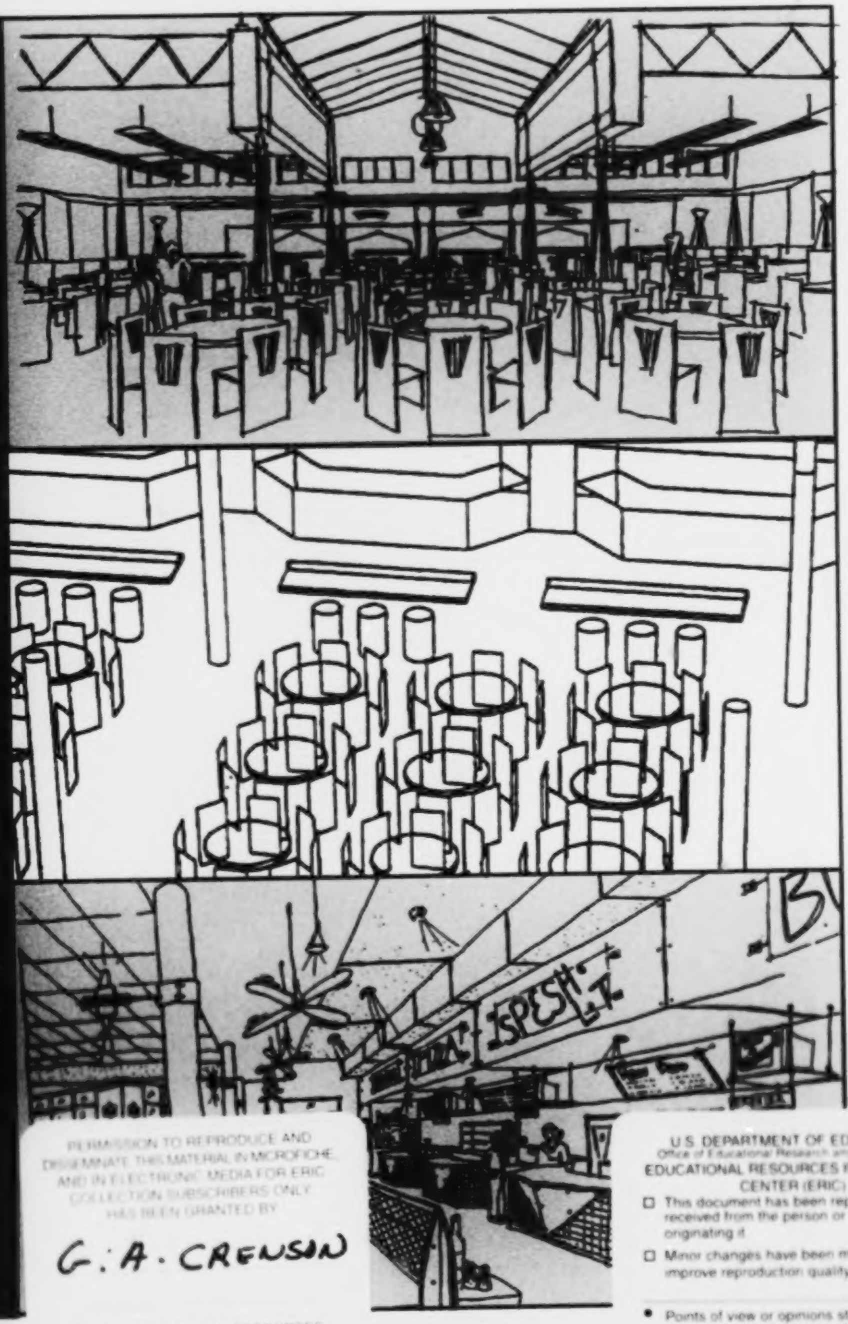

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MARYLAND STATE DEPARTMENT OF EDUCATION
SCHOOL FOOD AND NUTRITION SERVICE
DESIGN MANUAL

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MARYLAND STATE DEPARTMENT OF EDUCATION

SCHOOL FOOD AND NUTRITION SERVICE

DESIGN MANUAL

Maryland State Department of Education
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FOREWORD

The Maryland State Department of Education is committed to the goal of school improvement. We value the School Food and Nutrition Service as a school improvement program which supports the health and educational success of each student. In Maryland, and throughout the country, students who eat meals at school have access to nutritious foods and the opportunity to practice healthy nutrition behaviors.

We recognize that students today are sophisticated customers who seek choices and variety when and where they eat. The School Food and Nutrition Service of the 1990s must compete with a vast marketplace to remain financially sound. Advances in food service technology and restaurant design influence planners to approach the design process with broader expectations and more complex desired outcomes.

This *School Food and Nutrition Service Design Manual* was developed by a team of experts in facility design and in school food service. It is intended to guide School Food and Nutrition Service supervisors and school facility designers and administrators to plan food service, production, serving, and dining areas which increase student participation, which create a healthful and educational environment, and which produce safe and nutritious foods.

Sheila G. Terry, Chief
Nutrition and Transportation Services Branch

CHAPTER I: INTRODUCTION

The School Food and Nutrition Services Program of the present faces more challenges than ever before since its inception. It faces challenges from competing external forces such as widely appealing commercial food services and from internal forces such as design, operation, and education concerns.

A. External Challenges

The external challenges stem from a prolific and sophisticated restaurant and food service industry which spends millions of dollars vying for the attention and business of the student consumer. Commercial fast food enterprises and shopping mall food courts compete with school food service programs, even if the schools have closed campuses, by affecting students' expectations. Students' expectations of food services have been defined mostly by their dining out experiences in fast food chains and mall food courts. These expectations have risen greatly in the last twenty years due to the ever-increasing variety of commercial food types and services.

Higher expectations of students place a real demand on school food programs to provide a wider variety of food types. Traditional school staple foods cannot compete with the variety of commercially available foods. Commercially available ethnic foods and specialty foods have dramatically increased choices. Commercially available health foods such as low fat and high fiber vegetarian foods have increased consumer awareness of nutrition and impacted eating habits.

Higher expectations of students also place real demand on school food service programs for enhanced dining environments. The physical presentation of commercial food products and the dining environment in which they are offered is perceived to be dynamic, exciting, and inviting when compared to traditional, institutional school cafeterias. The variety of activities which occur in school dining spaces will benefit from a higher level of design energy which responds to these external forces.

In order to compete with commercial food operations, the school food service and nutrition program of today and tomorrow must recognize and respond to these influential forces which are shaping students' expectations. The program must embrace the future education landscape and food service marketplace and address these challenges by creating opportunities for education, design, and operation viability.

B. Internal Challenges

The internal challenges facing school food service and nutrition programs stem from design, operation, and education concerns. The challenge is to design inviting dining environments which successfully compete with outside commercial enterprises, while providing high quality, nutritious foods in a cost effective and informative manner.

Many school districts require food service programs to be financially self-sufficient. Due to considerable commercial competition, this has become increasingly difficult. It is important that careful consideration be given to determining the most appropriate food service program for a particular project. Life cycle cost studies should be used to inform the program type that is selected and developed as this will profoundly affect design concepts, construction costs, staffing, and operating expenses of the facility.

The design challenge is first to identify the appropriate type of food service and nutrition education program that will best meet the school's and students' needs. Second, incorporate into the program the appropriate design guidelines and recommendations contained in this manual. This will require the collective understanding, effort, and agreement of the design committee for the particular project. The aspirations for the design must mesh the program with the allowable construction budget, as well as with the future operating and maintenance budget of the project.

C. Purpose of This Manual

The purpose of this manual is to provide a strategy for meeting these challenges by identifying components which must be addressed in order to create and develop a successful food service and nutrition facility. This manual provides guidelines for identifying these components during the programming and design phases to ensure that they will be included in the final design for construction. It identifies certain education, operation, and design concerns which should be augmented with specific requirements of the local food service and nutrition program. Increased value is the end result of applying these strategies to the design process.

Value is added by:

- ***creating an efficient food service operation, which ensures financial viability.***
- ***improving the quality and variety of foods and therefore increasing student participation in the school food program.***
- ***enhancing the dining environment which therefore increases student participation in the school food program.***
- ***designing for the multiple uses of the dining space which therefore increases its effectiveness as a program area.***
- ***increasing student knowledge of nutrition.***

D. Nutrition Considerations

The National School Lunch and School Breakfast Programs are nutritional programs to promote the health of the nation's children. In June 1995, the United States Department of Agriculture (USDA) published new regulations as part of an integrated plan for promoting the health of the nation's children.

The nutritional requirements of the programs incorporate the 1995 *Dietary Guidelines for Americans* and will take effect no later than the school year 1996-1997. In accordance with the USDA regulations, the school lunch and breakfast programs will, over a week:

- *Limit total fat to thirty percent of total calories*
- *Limit saturated fat to less than ten percent of total calories*
- *Reduce the levels of sodium and cholesterol*
- *Increase the levels of dietary fiber*

Schools are encouraged to publish the nutritional content of menus. Display and signage areas can convey nutritional information.

The proper selection of food service equipment can promote the compliance with USDA requirements by enabling the school food service operation to prepare foods using methods that can reduce fat, such as steaming. Schools are encouraged to limit the use of other pieces of equipment than can increase fat consumption, such as fryers.

E. Nutrition and Education Outcomes

The goals for the food service and nutrition programs which are developed with the use of this manual are to achieve identifiable nutrition and education outcomes.

Nutrition Outcomes

- ***All students will choose to eat school meals and will express satisfaction with the quality of the meal, the service they receive, and the dining environment.***
- ***School Food and Nutrition Service will provide students with a variety of nutritious food choices which meet the 1995 Dietary Guidelines for Americans.***
- ***All foods prepared and served to students will be high in quality and safe to eat.***
- ***School dining facilities will provide an appropriate environment for interactive social skills practice and learning.***
- ***School Food and Nutrition Service serving and dining areas will provide opportunities to teach nutrition and to practice nutrition principles taught in the classroom.***
- ***School Food and Nutrition Service will increase student participation in order to sustain sound financial status.***

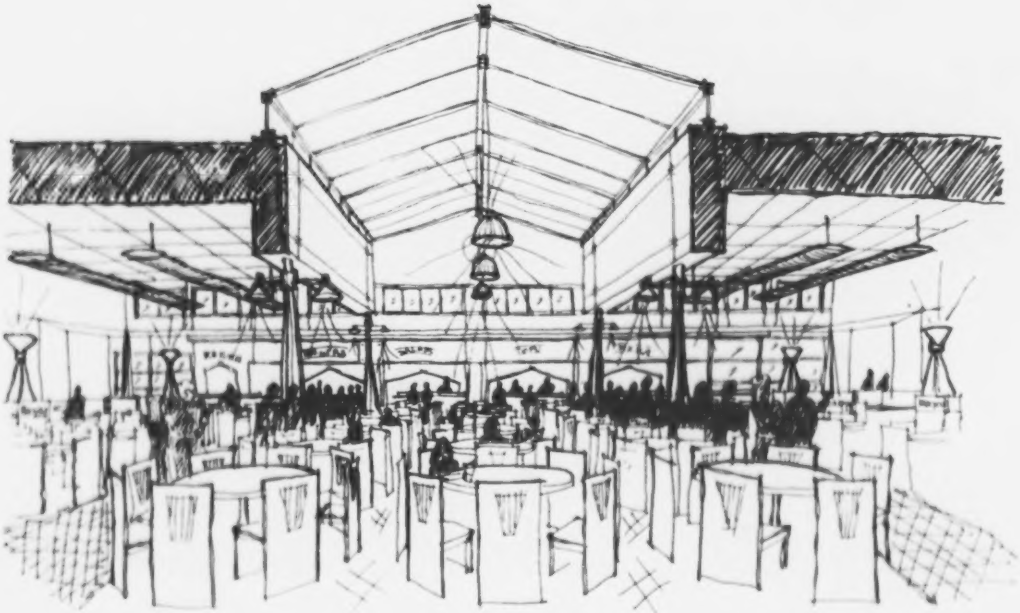
Education Outcomes

- ***Students will apply knowledge of food nutrition and make informed choices when choosing from school meal menu.***
- ***Students will apply nutrition concepts to their overall dietary habits.***

- ***Students will demonstrate consumer decision making skills when selecting school meals.***

- ***Students will demonstrate social decision making skills in experiential serving lines, serving areas, and dining room seating areas.***

- ***Students will demonstrate care and concern for the environment by participating in the recycling and waste management of items associated with school food and nutrition services.***



HIGH SCHOOL DINING SPACE

CHAPTER II : CREATING SCHOOL FACILITIES

A. The Process

In planning a facility, a school system must translate an educational philosophy into a three-dimensional place. In order to ensure that the facility is appropriate and well-designed, many points of view and areas of expertise must be tapped. A planning committee is assembled to bring together individuals with the diverse experience required. Sometimes the committee is charged with planning a new facility; other times the task at hand may be to renovate an existing facility. The committee will see the project progress through a number of distinct phases, from inception to occupancy. Although the process will vary from place to place and project to project, the basic sequence is consistent. The following steps outline a typical process:

Planning

- *Project approval and site identification*
- *Planning committee and planning subgroup formation*
- *Committee discussions and decisions on program, philosophy, content, staffing, organization, etc.*
- *Educational specifications preparation*
- *Selection of an architect*
- *Selection of a food service consultant (if required)*

Design

- *Pre-design meeting with the architect and food service consultant*
- *Schematic design*
- *Design development*
- *Preparation of construction documents*

Construction

- *Bidding and contract award*
- *Construction*
- *Acceptance of project and occupancy of facility*

Occupancy

- *Installation of moveable equipment and furnishings*
- *Occupancy*
- *Post-occupancy evaluation.*

B. The Planning Phase

The planning phase encompasses the identification of a need for a project, the definition of a solution involving construction of a new facility or renovation of an existing one, and a preliminary budget and funding source. Decisions are made within the framework of a master plan. Once a project is approved to proceed, a Planning Committee is formed to define the parameters of the project. The resulting document, the educational specifications, serves as the basis for the design phases which follow.

Interagency Committee on School Construction (IAC) Projects

The State of Maryland provides construction funding to school systems through the Public School Construction Program (PSCP) governed by the IAC. Food and nutrition services projects may be funded through the PSCP as part of a new school construction, a renovation, or an addition to an existing school. PSCP staff and staff from supporting agencies, the Maryland Office of Planning, Department of General Services, and Maryland State Department of Education (MSDE), are available to assist in all phases of project development. Refer to the *PSCP Administrative Procedures Guide*.

C. The Planning Committee

Most food service projects take place within larger frameworks, such as new school construction or major renovation projects. Some projects, however, are specifically for the modernization of a food service and nutrition facility. In either case, there will be a planning committee which has a key role in the decision making process for the overall project. The planning committee is a collection of people with diverse interests and expertise. Although the planning process takes longer with many persons involved, divergent frames of reference and points of view provide a broad basis for valid decisions. These decisions will guide the planning and design processes, creating a functional facility.

Planning committees vary in their size and composition, but all planning committees should include at minimum the following:

- *the principal*
- *the local school facilities planner*
- *the project architect*
- *MSDE school facilities specialist*
- *school food service manager*

Other members may include:

- *support services staff*
- *parents*
- *teachers*
- *students*
- *food service consultant*
- *nutrition consultant*
- *a representative from MSDE Nutrition and Transportation Services Branch*

The local administration ensures that educational programs, budget constraints, and facilities standards are incorporated into the project. The facilities planner is usually responsible for coordinating the process. Even while the project is being developed as a whole entity, each of its programmatic components is studied and developed individually. The food service facility will be one of these components. As such, it will be developed and reviewed by appropriate members of the planning committee.

The future users of the facility are represented by the principal, teachers, students, and support staff. For a new facility which has yet to be assigned staff, personnel and students from other facilities can substitute.

The participation of the users ensures that theory will not overwhelm practical concerns and provides the insight that grows from daily experience.

The food service manager is a key committee member for food service and nutrition facilities and must be involved from the onset of the project. This assures his/her participation in the total project and utilizes his/her knowledge and expertise in the formation of both nutrition and food service programs and facilities.

The MSDE school facilities specialist participates in an advisory role. He/she can serve as a resource on national trends, practices across Maryland, the state-level standard and references. The specialist can also serve as a link to other state agencies.

The architect may join the project at its inception or after the completion of the educational specifications. It is the architect's job to turn the text of the educational specifications into a design and then produce two-dimensional drawings and technical specifications which will form the contract documents for construction. When required, a food service design consultant will be employed.

For larger or complex projects, additional planning committee members may come from other government agencies, or from the neighboring business or residential community.

The planning committee should be involved throughout the entire process of facilities development, although its major impact is in the planning and design phases. The committee will review the project at major milestones. The food service and nutrition specialist will also be involved in the preparation of detailed furniture and equipment lists. Specifically, the committee should participate in the following steps:

- ***Preparation of educational specifications***
- ***Interpretation of the specifications for the project architect***
- ***Development of alternative schematic design concepts***
- ***Review of schematic design documents***
- ***Review of design development documents***
- ***Review of final design documents and equipment lists***
- ***Post-occupancy evaluation***

D. Educational Specifications

Educational specifications articulate the physical requirements for the project as an outgrowth of the educational program derived from national, state and local goals and instructional strategies. They must be consistent with the local educational facilities master plan and the overall project scope, capacity, and budget as approved by state and local sources. They will guide the architect through the design and construction of the project.

Educational specifications are a text document describing the food service and nutrition program, educational activities, philosophy, and performance expectations for construction projects. They are needed whether the project involves new construction, addition, or renovation. The content of the specifications for small and large projects should include the following:

I. Project Rationale
  Introduction
  The community
  School board policies
  Belief statements
  Scope of work, budget, and schedule

II. The Educational Plan
  Curriculum
  Instructional methods
  Staff support
  Technology

III. Project Design Factors
  Site conditions
  Building systems

IV. Activity Areas
  General overview
  Program functions for each education and service program in the project.

V. Summary of spatial relationships

VI. Summary of spatial requirements (Net and gross square feet)

This outline is taken from Appendix D of the *PSCP Administrative Procedures Guide*. The *Guide* contains further explanation of the intent of each section. The final educational specifications document is a record of decisions about activities for students, teachers, and administrators, and a description of the spaces required to support such activities.

The completed educational specifications become the basis from which the project architect proceeds with the design. They also serve as a bench mark for checking the progress of the project and its responsiveness to the intended programs.

E. Design and Construction

After the educational specifications have been completed and approved, the architect begins to transform it into a design for physical space. In designing a facility, an architect starts with a general, or schematic view of the program, and gradually develops a very specific response to the program requirements. The final design product is a set of instructions for contractors, depicting in detail the intended facility. Each design phase builds on the previous work and reflects a dynamic process of interaction between the architect and the planning committee.

1. Pre-Design

When an architect assumes responsibility for the design project, he/she assumes a set of requirements. The foundation of these are the educational specifications, but additional requirements are building codes, safety/ environmental regulations, local/state standards and procedures, constraints imposed by funding, and existing conditions. Often a preliminary meeting is held to identify and clarify the project requirements and to interpret the specifications as needed for the consulting architect. The planning committee, the MSDE school facilities specialist, and the architect should be present. When renovating an existing building, it is useful to hold the pre-design meeting at the school. Renovation projects are inherently limited by existing conditions and will include more design compromises than new construction. The design criteria in this guide should be followed as closely as is feasible. Creative combinations of space and innovative designs may be developed to meet particular situations and should be encouraged.

2. *Schematic Design*

The schematic design phase develops two or more preliminary site and building design solutions, each meeting major program goals. Schematic designs are conceptual and derive from requirements set forth in the educational specifications and good architectural and engineering practice. After evaluating alternatives, the planning committee selects one solution which the architect refines through a process of review and revision lasting several weeks.

The food service experts on the planning committee should monitor the schematic design closely for overall relationships between the food service program and other disciplines and for the relationships among food service spaces. Within the spaces, there should be an indication that an appropriate layout can develop from the space and proportions provided. Large scale plans showing furniture and equipment should be available at the schematic phase.

3. *Design Development*

During the design development phase, the basic elements articulated in the schematic design phase are developed and fine-tuned. The building's footprint and individual room dimensions are finalized; fixed furnishings and equipment are located; construction details are begun; utilities and systems are developed and located; and all aspects of the project take on greater depth and sharper focus.

The planning committee has an important role at this phase because design development represents the first opportunity to get into the details of the design and may be the last practical opportunity to make substantial changes in the project. For food service, attention to detail is critical. Building upon the approved schematic design, the architect will present the finalized size and relationships of spaces, and the layout of serving areas, workstations and equipment.

Plumbing, heating, ventilation, exhaust, cooling, lighting, electronic communications, and power systems are developed.

Design development is a critical time to convey to the architecture and engineering design team the specific furniture and equipment requirements including type, manufacturer, electrical accessories, etc. It is also a good time to discuss finish requirements and detailed storage requirements. Movable equipment and furnishings, although not typically funded and installed during construction, should be shown on design development drawings to convey the architect's understanding of the layout, circulation, and other design considerations.

Cost estimates, energy analyses, and other data are presented during design development. This phase, like schematic design, will be formally reviewed at the local and state levels.

4. Construction Documents

During the construction document phase, the architect produces detailed documents which will form the contract for construction. The primary documents are construction drawings and written specifications. All systems and elements will be fully described, including demolition, sitework, structural work, roofing, doors, windows, finishes, equipment, plumbing, heating and cooling, fire protection, lighting, power, and electronic communications. A detailed cost estimate will be prepared.

During this phase, the design should reflect the decisions made by the architect and the planning committee. If substantial changes to the design originate outside of the planning committee, they should be brought to the key decision makers of the general committee for evaluation and acceptance. The food service specialist continues to advise on specific concerns as they arise.

When the construction documents are complete, they will be reviewed at the local level. Locally approved documents will then be reviewed at the state level. Once approved, the project can be bid for construction.

5. Construction

During the construction of the facility, planning committee involvement is minimal, limited to color selections or other minor input. Significant changes to the project are unusual during construction, but do sometimes occur due to unforeseen problems. Changes which affect the food service program in a substantive way should be brought to the notice of the food service manager.

If the project is the renovation of an existing facility, construction may be phased so that the school continues to operate while renovations takes place. If this occurs, coordination will be necessary between the facilities planners and the school staff to vacate areas on schedule and to isolate areas under construction. In general, school staff should bring any problems or concerns to the attention of the school system's facilities planner rather than trying to resolve issues directly with the contractor.

6. Installation of Furnishings and Equipment

Once the construction is substantially complete, furnishings and equipment are installed. Some components may be installed under the general contract for construction, but there may be independently contracted vendors and school system personnel involved, as well. Careful planning is required to coordinate responsibilities which typically include providing, installing, testing, and balancing equipment. All warranties, operating manuals, training, and servicing of new components and systems must be obtained.

7. Occupancy and Post-Occupancy Evaluation

Once construction is complete, the staff can move into the facility. Provision for training in operating new equipment and systems should be made before the students arrive. Maintenance personnel should become familiar with any new materials or finishes and their requirements, as well as with mechanical systems. Staff should note any questions and notify their facilities office of any problems encountered. It is best to correct problems before the final payments have been made and while components are under warranty.

A post-occupancy evaluation can be an invaluable learning tool. Typically, a team visits the facility in the second year of occupancy. A checklist forms the basis of the evaluation, but there should be provision for comments from users. The facilities planners will use this information to revise local standards. The next planning committee will benefit from the information.

CHAPTER III : DESIGNING SCHOOL DINING, SERVING AND KITCHEN AREAS

It is the intent of MSDE to encourage the development of school dining facilities which enhance the dining and nutrition education experience and provide for the multiplicity of activities that occur in school dining areas as required by the educational specifications. It is the responsibility of the programming committee to identify the functional and area requirements for dining rooms and kitchens. This guide will outline various possible uses for the dining area in order to illustrate the potential of the space. Ultimately, the educational and food service/nutrition program specifications must be followed or adapted to include ideas discussed here.

A. Adjacency Considerations and Activities

The location of the food service program and dining area within the school is of primary importance as it controls the type of programmed activities which can occur there. The relationship between the food service program and adjacent programs can have a dramatic impact on the potential uses of the dining area and adjacent spaces.

Adjacency considerations for dining areas are:

- ***near active student circulation areas***
- ***accessible to the public for after hours use***
- ***kitchen near service area to receive deliveries***
- ***near other major student activity spaces***
- ***near gymnasium and/or auditorium for after hours use***
- ***near school store***
- ***near outdoor dining/activity area***
- ***near student government space (high schools)***
- ***near toilet facilities***
- ***near guidance and career center (high schools)***
- ***near stage (elementary and middle schools)***
- ***readily supervisable from nearby administration***
- ***acoustically separated from quiet program areas (such as media centers and teaching spaces)***

Activities

One of the most valuable features of a dining area in a school is that it can be used for many activities other than dining. A dining area which is designed to function well as a multi-use space, both during school and after hours, is a wise investment. The key is integrating the necessary and diverse components of different use groups with the necessary components of dining use.

Activities other than student dining which may occur in dining areas are:

- ***student assemblies***
- ***ceremonies***
- ***banquets***
- ***testing***
- ***public meetings***
- ***faculty dining***
- ***community dining***

- ***dramatic events***
- ***athletic events***
- ***social events***
- ***instructional activities***
- ***gymnastic events***
- ***musical events***
- ***after school programs***

The diverse activities which must be accommodated in the dining area must be anticipated in order to properly plan for them. The educational specifications should clearly define the area requirements and what kind of relationship is desired between the food service program and surrounding program areas. It should also define the various activities/uses envisioned for the dining area. Certain functional activities require specialized equipment, such as sound systems and dimmable light systems, which must be programmed into the specifications, designed into the construction documents, and provided for in the project's construction budget and future operating budget.

Further, the diverse activities which will occur in a dining area require different, often conflicting, material finishes. For instance, a dining area in an elementary school frequently serves as a recreation or physical education space for activities such as basketball and volleyball. This same cafeteria space may also serve as an auditorium for drama and music. The preferred floor surfaces for these individual activities are different: wood (physical education), carpeting (auditorium), and vinyl composition tile (cafeteria). Thus, design committee members must be aware of the inherent conflicts associated with multi-use spaces and prepare to make decisions which may involve some level of compromise for either functional uses or material finishes.

Careful consideration should be given to the following items which are frequently sources of material selection conflicts and compromises in the development of multi-use dining spaces:

- ***floor finishes***
- ***wall finishes***
- ***ceiling finishes***
- ***daylighting***
- ***artificial lighting***
- ***spatial quality and ceiling heights***
- ***maintenance***
- ***access to outdoors***
- ***signage and displays***
- ***degree of closure***

B. Dining Environment Design Considerations

- ***Provide natural daylighting*** whenever possible. School food service is primarily a daytime activity. Maximize opportunities for introducing natural daylight through windows or skylights. Control direct sunlight with sunscreening elements, blinds, or shade cloths.

- ***Provide views and access to outdoor dining areas*** for students and staff whenever possible.

- ***Provide a colorful, well-lit environment.*** Supplement natural light with appropriate levels of artificial light. Plan for evening uses of the space. Provide separate switching of light fixtures to maximize energy efficiencies and minimize operating costs. Coordinate color schemes with artificial light source color and temperature.

• ***Locate the long side of the kitchen adjacent to the dining room*** to maximize the length of the serving area. Multiple serving lines need to be accommodated in almost every school type. Considerable frontage along the kitchen is required in order to create an efficient and effective serving area. High school food courts require the greatest length of serving area. *(See Chapter IV for illustrations.)*

• ***Provide visual connection between serving area and dining room*** by utilizing transparent materials such as glass doors, windows and glass block.

• ***Provide interesting and comfortable furniture arrangements.*** Furniture can enhance attractiveness, create intimacy, and provide visual relief. Furniture can break down the scale of a large room. It can be moveable and provide for a variety of arrangements for dining, instruction, and assembly.

• ***Provide for efficient waste management and recycling*** with integrated collection stations.

• ***Break down large scale spaces into more intimate smaller spaces*** through the use of ceiling treatments, planters, furniture, floor patterns, and lighting. Fixed items such as booth seating and planters should occur near the perimeter of the space and not interfere with or limit other non-dining uses of the space. Floor level changes can also break down the scale of the space, however, they should be carefully considered and reviewed by the planning committee to ensure that they do not limit non-dining uses of the space.

• ***Create an attractive environment*** which suggests a comfortable and pleasant dining experience.

• ***Maximize sightlines throughout space*** and design for easy supervision of space. Avoid deeply niched areas which are difficult to supervise.

• ***Provide for future flexibility*** by designing a space which can be subdivided with operable walls or curtains. These items and their structural framing requirements may be specified as "Add Alternates" to the project if not in the original program or budget.

Consider specific design elements required by specific program uses:

• ***Recreational activities and physical education:*** provide game lines on floor, resilient flooring for physical activities, wall pads, retractable game boards, climbing ropes, etc.

• ***Theatrical activities:*** provide dimmable house lighting, stage curtains, public address system, projection screen, blackout curtains, etc.

• ***Instructional activities:*** provide tackboards, markerboards, chalkboards, display cases, access to power, voice, video, and data cabling.

• ***Dining activities:*** provide floor and wall finishes which are stain resistant, durable, easy to maintain, and attractive. Flooring must be non-slip and compatible with programmed activities and furniture supports (i.e. metal, plastic, or nylon rollers, casters, etc.).

• ***Miscellaneous activities:*** may require specific design elements such as: booth seating, specialty lighting, planters, mirrors, super graphics, multimedia display systems, music, white noise, video displays, and signage.

C. Dining Areas, Meal Periods and Seating Requirements

To determine the area and seating capacity required for a dining area, identify the following factors:

- ***room use requirements***
- ***number of meal periods***
- ***overall student population***
- ***storage requirements***
- ***circulation/aisle space requirements***

Dining Areas:

As previously discussed, the dining room may be designed for various activities. The size of the room will depend upon the most demanding use of the space. Elementary school dining spaces frequently combine auditorium or gymnasium (or both) functions with the dining functions. For example, if a dining area is to also function as a gym and an auditorium, the program which requires the greatest area should govern the size of the space. In addition to the room size, area should be provided for the ancillary spaces which support the programmed functions of the room. For example, additional storage space should be provided for cafeteria tables with attached seats and auditorium seats (loose/stackable/interlockable chairs), when the space is functioning as a gym.

The educational specifications should provide net dining area parameters or requirements. However, the final gross area will be affected by the following:

- ***aisles and circulation zones within the space***
- ***clearance requirements between program components***
- ***efficiency characteristics of selected seating styles***
- ***number of meal periods - which proportionally affects number of seats required***

Meal Periods:

The educational specifications may state the number and type of meal periods that are to be designed for. However, it may also require comparative consideration of more than one approach and may call for a recommendation of one type. If so, there are several ways to schedule meal periods: single meal periods, multiple meal periods, and staggered meal periods. Each has advantages and disadvantages depending upon the evaluation criteria.

Single Meal Periods:

The dining room is designed to seat the entire school population at one time for one meal period. The kitchen and serving areas must house sufficient preparation and serving equipment to accommodate those who participate in meal programs. The food service program must also provide a staff large enough to prepare and serve the needed quantities in the time period provided. Because this method can be capital intensive, it is used predominantly in small schools (population less than 300).

Although this method provides students with the most social interaction, it has numerous disadvantages. In larger schools, it requires a very large dining area, large operating staff, large supervising staff and a lot of operating equipment, any of which may be economically prohibitive. Some of the capital expense can be offset if the large dining area serves double duty as the school's gymnasium during the time when it is not functioning as a dining room.

Multiple Meal Periods:

The dining room is designed to seat a fraction of the entire school population at one time, for two or more distinct meal periods. The greater the number of meal periods, the smaller the dining area, kitchen area, and serving area that is needed.

Because of multiple meal periods, economies are achieved through repetitive use of a smaller dining area, fewer tables and seats, fewer serving lines, less serving equipment, less preparation equipment, and fewer operating staff. The greater number of meal periods also reduces staff required for supervision during a meal period. The major disadvantage, depending upon the number of meal periods, is that some students may eat lunch very early or very late in the day.

Staggered Meal Periods:

The dining room is designed to seat a certain percentage of the entire school population at any given moment, for the duration of the meal periods. Students are released for lunch on set intervals, a few minutes apart, so that there is a constant flow of students at the serving areas.

This method can be developed to minimize the required dining area and seating capacity. However, there is considerably more administrative effort required to effectively stagger the class releases. Supervision and student body control is more complex and difficult due to overlap of dining periods. This method is used primarily in elementary schools.

Seating Requirements:

The number of seats which must be provided during a lunch period depends on the overall student dining population divided by the number of meal periods. Elementary and middle schools can anticipate a dining population equal to that of the entire school. High schools, however, are more site and lunch program sensitive. The student dining population for a high school is dependent upon how many students go off-campus for lunch.

This number can vary dramatically depending upon the quality of on-campus school food service and the quality of off-campus food service. Urban and suburban high school locations with open campuses can expect a certain percentage of students to go off-campus for lunch. Rural school locations with open campuses should consider the distance to the nearest off-campus food establishments when determining their student dining population. Program committee members should carefully consider how the high school dining program will respond to off-campus dining forces.

Over the past several years, many high schools have experienced a decline in on-campus dining. This has resulted in lost revenue opportunities for the schools. Recently, numerous high schools have been designed with food courts to compete with off-campus food services such as mall food courts and fast food establishments.

These on-campus food courts have been designed to attract back the off-campus dining population. They are also intended to increase school revenues by creating an attractive and profitable school food service program. Accordingly, these schools have increased the number of seats required by their food service program. Then, they have either increased the area for seating in their dining rooms or they have designated areas outside of the dining room (such as a major lobby spaces or commons areas) for overflow dining (whether sitting or standing).

D. Seating Considerations

Establish the number of seats needed, as required by the education specifications or as described in the previous section, then determine the quality, efficiency, and type of seating for the appropriate school type.

Quality Considerations for Seating:

- ***durable construction and components***
- ***easy to move, portable, lightweight***
- ***compact, stores easily, foldable, stackable***
- ***lockable rollers, casters, or wheels***
- ***rollers/wheels compatible with specified flooring material***
- ***easy to clean, maintain, repair***
- ***select non-trendy colors which will endure and not appear dated***
- ***select styles and colors which will coordinate easily with other finishes***

Efficiency Considerations for Seating in Dining Area:

- ***Maximize efficiency of seating*** capacity and safety of furniture arrangement and coordinate these with all applicable codes.

- ***Utilize double loaded aisle ways,*** 6'-4" width minimum, for two-way flow with food trays.

- ***Maximize efficiency*** of circulation flow into and out of seating areas.

- ***Balance efficiency*** considerations with inviting, friendly layout.

- ***Utilize table types, shapes, and sizes*** which optimize seating capacity and are appropriate for education level of student population.

- ***Balance efficiency*** considerations with inviting, friendly layout and program requirements.

- ***Refer to Building Officials and Code Administrators International, Inc. (BOCA) and the National Fire Protection Association's Life Safety Code (NFPA) 101*** for additional assembly seating requirements such as: required clearances between seatbacks and aisles and/or aisleways, number of required exits from space, clear egress width minimums depending upon furniture arrangement and room occupancy load.

Seating and Table Type Considerations:

- ***The shape and capacity*** of the dining room will influence seating and table type selection.

- ***The maturity level of the student population*** will influence seating and table type selection: tables with attached seats require fewer social decisions by students and are appropriate for elementary schools and some middle schools. Tables with detached seats require more maturity and are appropriate for some middle schools and high schools.

- ***Long, rectangular tables*** with eight or more seats are very efficient, but less social.

- ***Round, sixty inch diameter tables*** with eight seats are very social while moderately efficient.

- ***Small rectangular tables*** with two or four seats are not very efficient when used individually, but they can be combined to create longer, more efficient seating arrangements when needed.

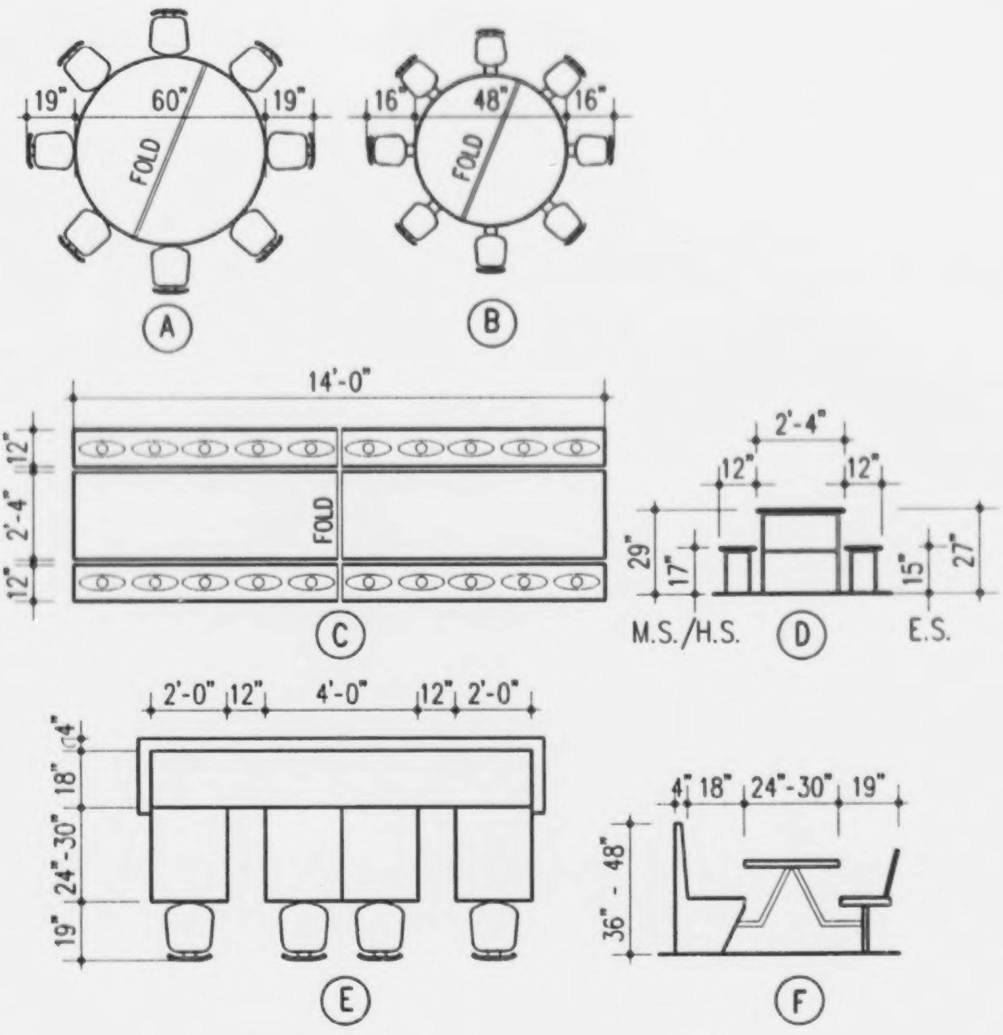
- ***Long, rectangular tables*** with bench style seating can allow for temporary occupancy increases for special events such as assemblies.

Seating Selection Guidelines for an Elementary School:

- ***Provide tables*** with attached seats or benches - this simplifies social decisions.

- ***Provide colorful tables*** and chair heights economically proportioned for two sizes: pre-kindergarten, kindergarten and first grade (first size) and grades two through six (second size).

- ***Provide 12 - 14*** net square feet per person.


19"
60"
19"
FOLD
A
16"
48"
16"
FOLD
B
14'-0"
12"
2'-4"
12"
FOLD
C
2'-4"
12"
12"
29"
17"
15"
27"
M.S./H.S.
D
E.S.
2'-0"
12"
4'-0"
12"
2'-0"
4"
18"
24"-30"
19"
E
4"
18"
24"-30"
19"
36" - 48"
F

KEY:

- A. M.S. / H.S. ROUND TABLE
- B. E.S. ROUND TABLE
- C. FOLDING TABLE WITH ATTACHED BENCH
- D. SECTION THROUGH FOLDING TABLE
- E. H.S. BOOTH STYLE SEATING
- F. SECTION THROUGH BOOTH STYLE SEATING

SEATING TYPES

Seating Selection Guidelines for a Middle School:

- *provide mostly tables with attached seats or benches, some with detached seats*
- *provide a variety of table shapes and capacities*
- *provide tables and chair heights proportioned for ages 12-14*
- *provide 12 - 14 net square feet per person*

Seating Selection Guidelines for a High School:

- *provide mostly tables with detached chairs*
- *provide some fixed booth type seating (ten to twenty percent when possible)*
- *provide numerous (ten to twenty percent) small tables (two or four seats)*
- *provide a variety of table shapes and capacities*
- *create interesting arrangements*
- *allow for students to arrange furniture themselves*
- *provide tables and chair heights proportioned for ages 15 and up*
- *provide 14 - 16 net square feet per person*

E. Stacking Considerations

Stacking refers to students lining up at serving areas during lunch periods. *Stacking* preferences will vary with the physical dining environment as well as with the school staff members responsible for supervising the lunch period.

Key stacking considerations:

- ***Consult with the food service designer and owner*** to establish ideal stacking areas that are specific to the food service program.

- ***Avoid conflicts*** between those standing in line waiting to be served and those already served and looking for seating.

- ***Provide adequate clearances*** for one way and two way traffic flow as needed by the food service program and the design of the dining space.

- ***Utilize dining room features,*** such as columns, condiment counters, and booth seating, to establish natural edges along stacking areas.

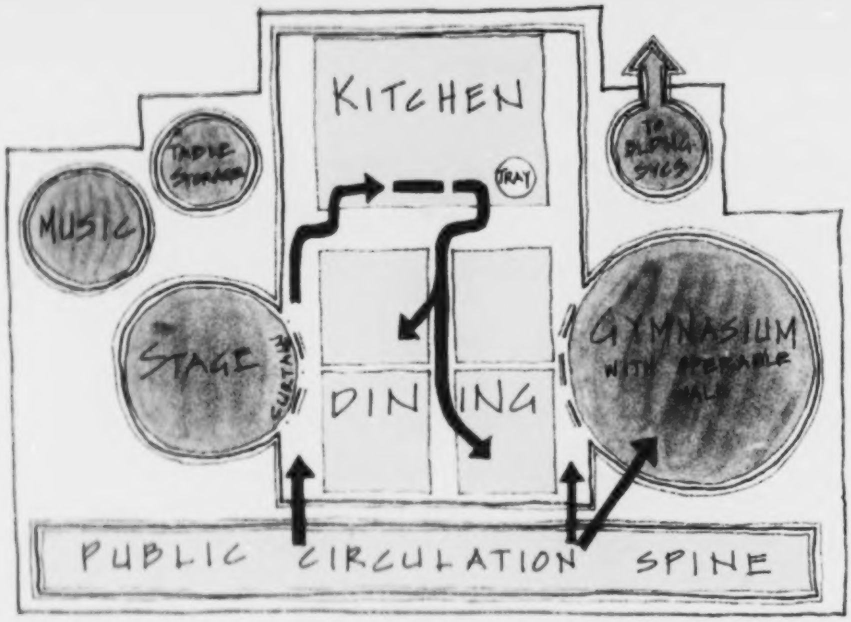
- ***Provide 3'-2" minimum*** (4'-0" preferred) aisleways for one-way traffic with trays.

- ***Provide 6'-4" minimum*** (8'-0" preferred) aisleways for two-way traffic with trays.

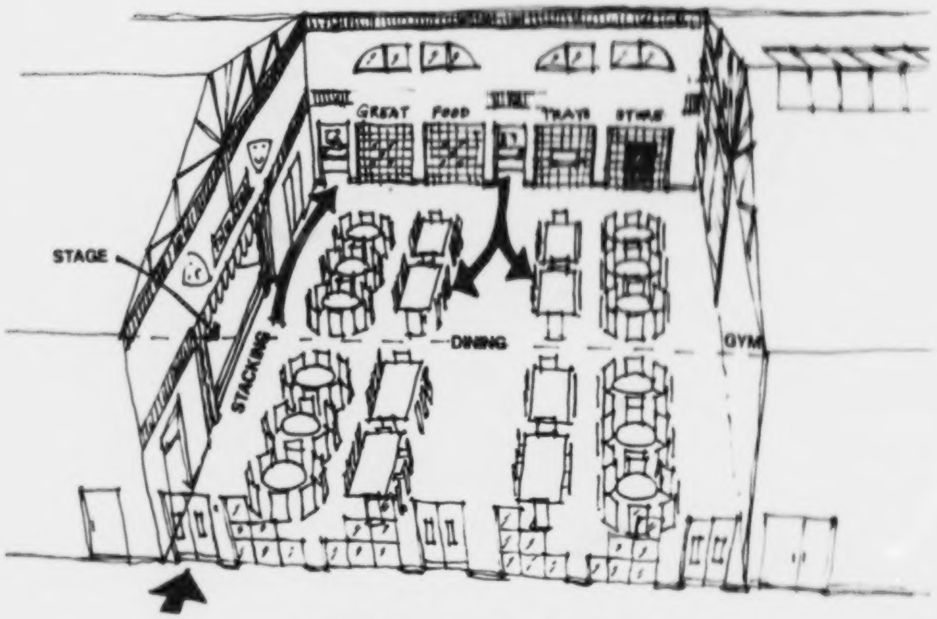
- ***Align entrances*** to serving lines with stacking aisles in dining area.

- ***Refer to BOCA and Life Safety Code (NFPA-101)*** for minimum requirements in assembly seating areas.

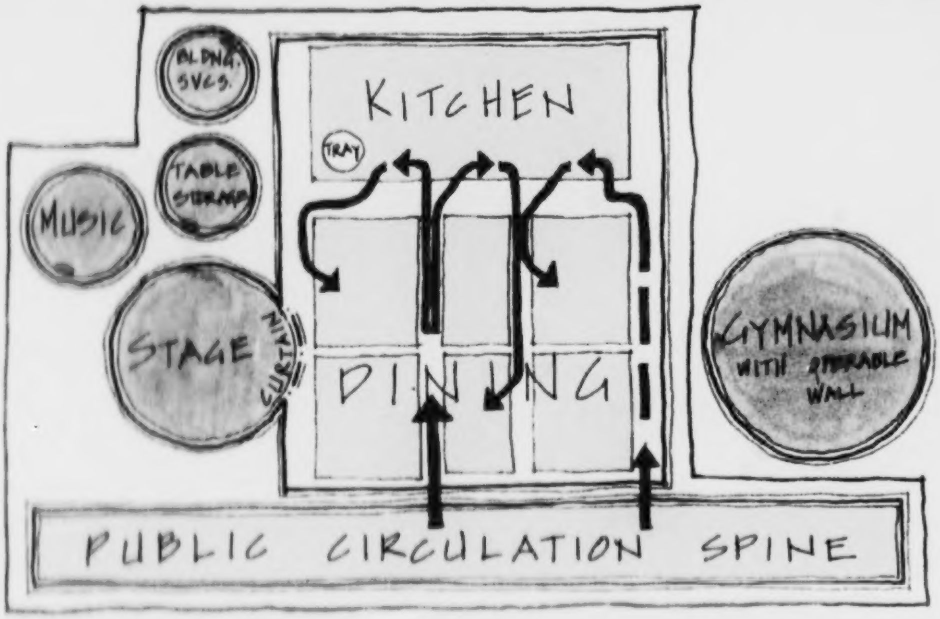
- ***Refer to the following pages for dining room flow diagrams*** which illustrate stacking areas, aisle areas, food service areas, and seating areas.


KITCHEN
TABLE STORAGE
TRAY
TO BLDG. SVCS
MUSIC
STAGE
CURTAIN
DINING
GYMNASIUM WITH OPERABLE WALL
PUBLIC CIRCULATION SPINE

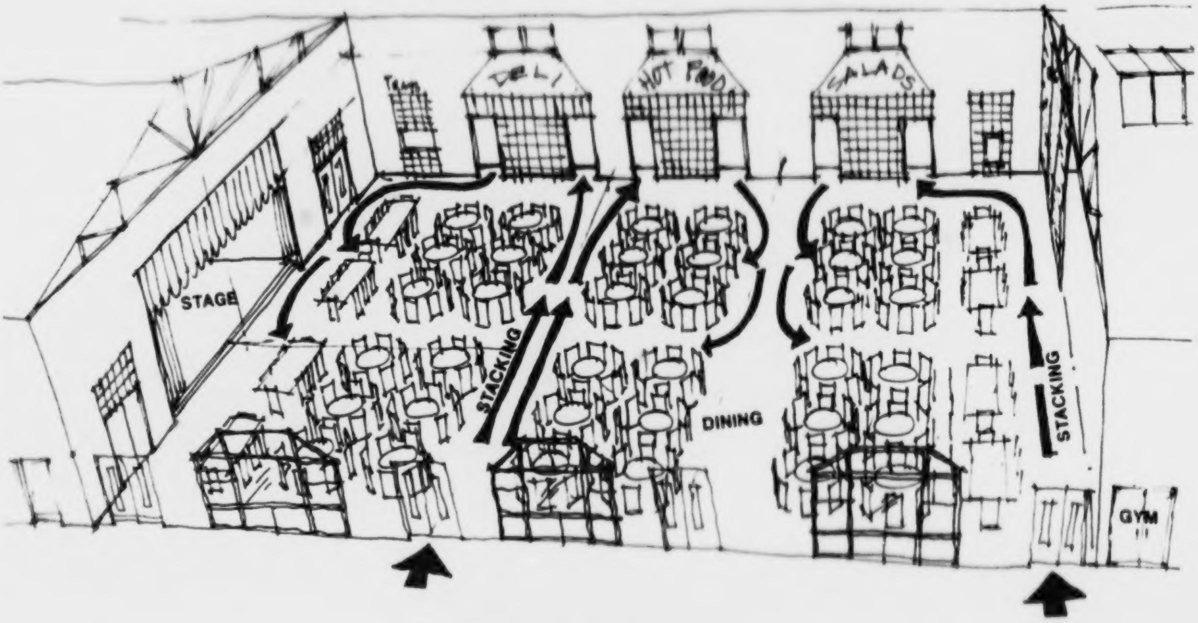
ELEMENTARY SCHOOL DINING CONCEPT PLAN


GREAT
FOOD
TRAYS
STORE
STAGE
STACKING
DINING
GYM

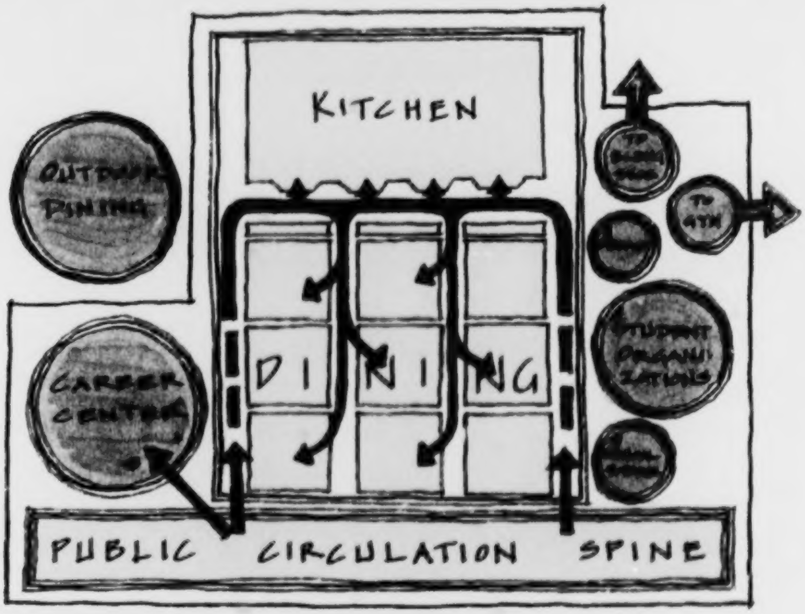
ELEMENTARY SCHOOL


BLDNG. SVCS.
KITCHEN
TRAY
TABLE STORAGE
MUSIC
STAGE
CURTAIN
DINING
GYMNASIUM WITH OPERABLE WALL
PUBLIC CIRCULATION SPINE

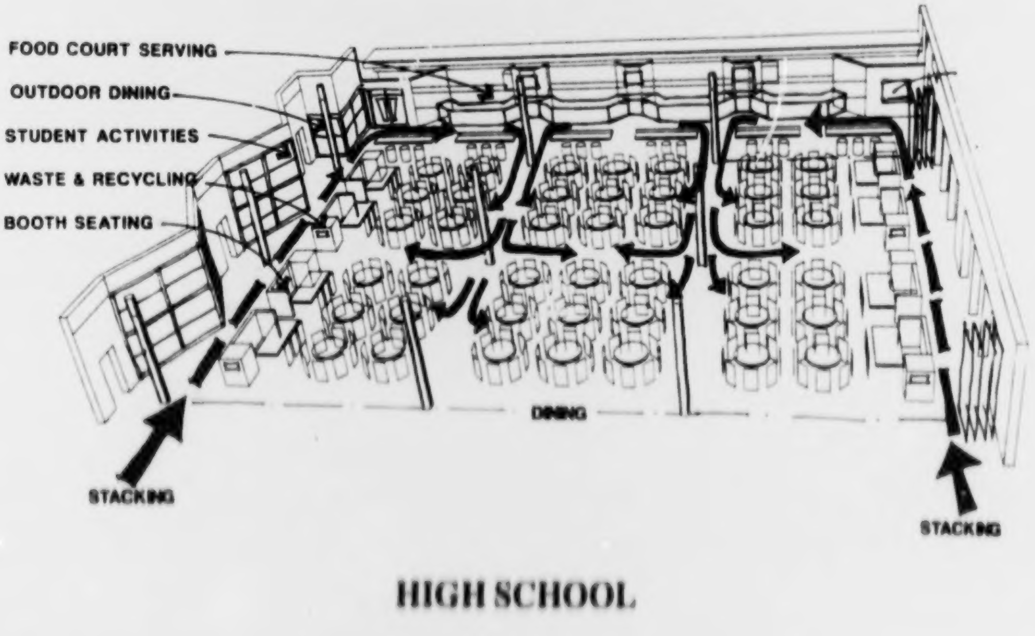
MIDDLE SCHOOL DINING CONCEPT PLAN


DELI
HOT FOOD
SALADS
STAGE
STACKING
DINING
STACKING
GYM

MIDDLE SCHOOL


KITCHEN
OUTDOOR DINING
CAREER CENTER
DINING
TO GYM
STUDENT ORGANIZATIONS
PUBLIC CIRCULATION SPINE

HIGH SCHOOL FOOD COURT CONCEPT PLAN


FOOD COURT SERVING
OUTDOOR DINING
STUDENT ACTIVITIES
WASTE & RECYCLING
BOOTH SEATING
DINING
STACKING
STACKING

HIGH SCHOOL

F. Serving Areas

Serving areas are critical to the success of the food service and nutrition program for several reasons. When they are designed well, serving areas:

- *facilitate the flow of students from stacking areas to seating areas*
- *provide nutrition information precisely when and where needed - at the time when food selection occurs*
- *provide an appealing atmosphere which enhances the desirability of food products*
- *quickly and clearly convey food choices*
- *minimize redundancy and maximize efficiency of serving staff*
- *expedite purchase of food products*

Serving areas should be designed to a higher energy level than the remainder of the dining space. This area can be thought of as a **"Retail Activity Zone"** where students are presented with the food service product.

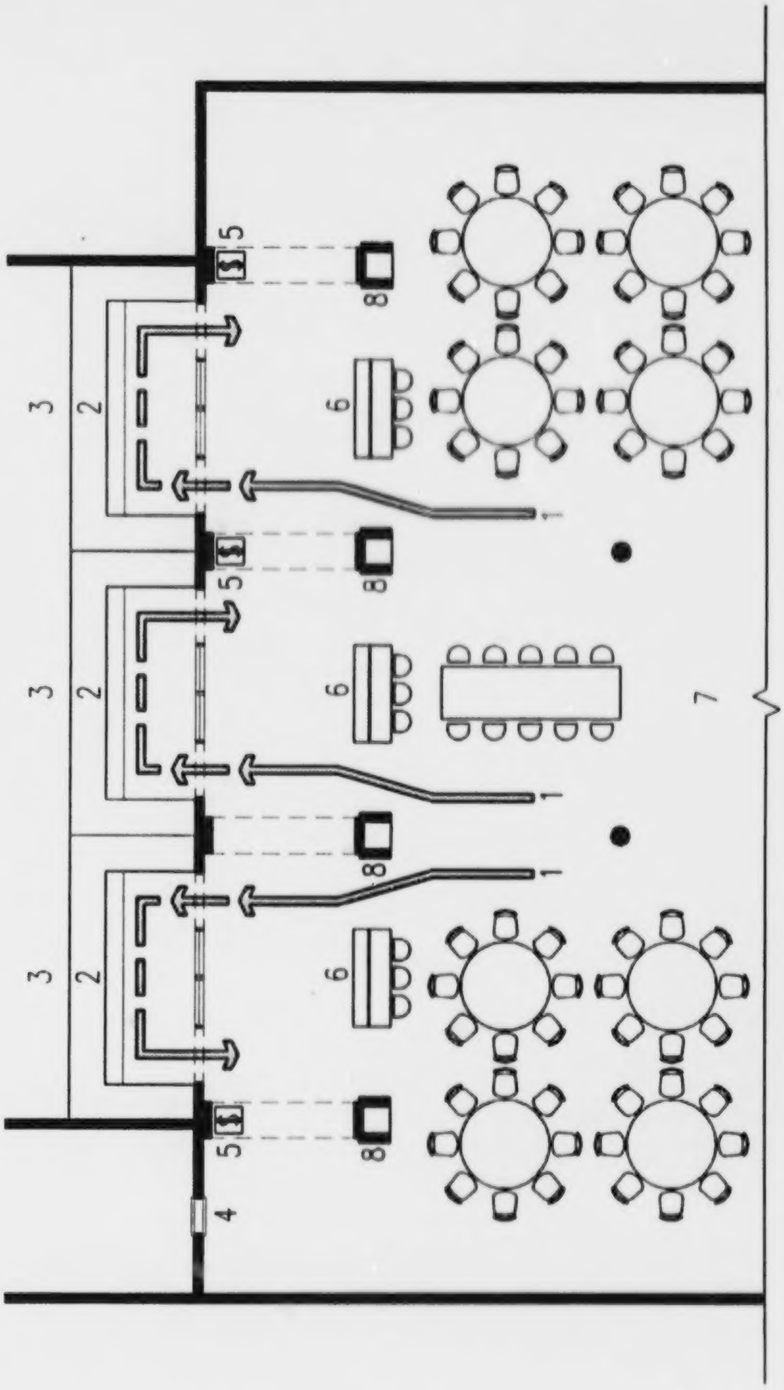
The serving area is where the food service program displays its product and entices its customer. In closed campus elementary, middle, and high schools, there is an opportunity to attract more students to participate in the food service program with an appealing presentation. In open campus high schools, the food serving area is essentially in competition with outside commercial food establishments.

In order to attract more students to participate in the food service program, this **"Retail Activity Zone"** should be exciting and appealing:

- ***Provide lighting levels*** appropriate to commercial food product display with lamp types which adhere to code regulated energy guidelines and which are easy and affordable to maintain and replace.
- ***Provide colorful, durable, and easily cleanable finishes*** appropriate to commercial food product display.
- ***Provide clear, colorful signage*** that is suited to the educational level of the reader.
- ***Provide a bright, attractive atmosphere*** which enhances the presentation of the food product.
- ***Clearly identify*** degree of self-service available.

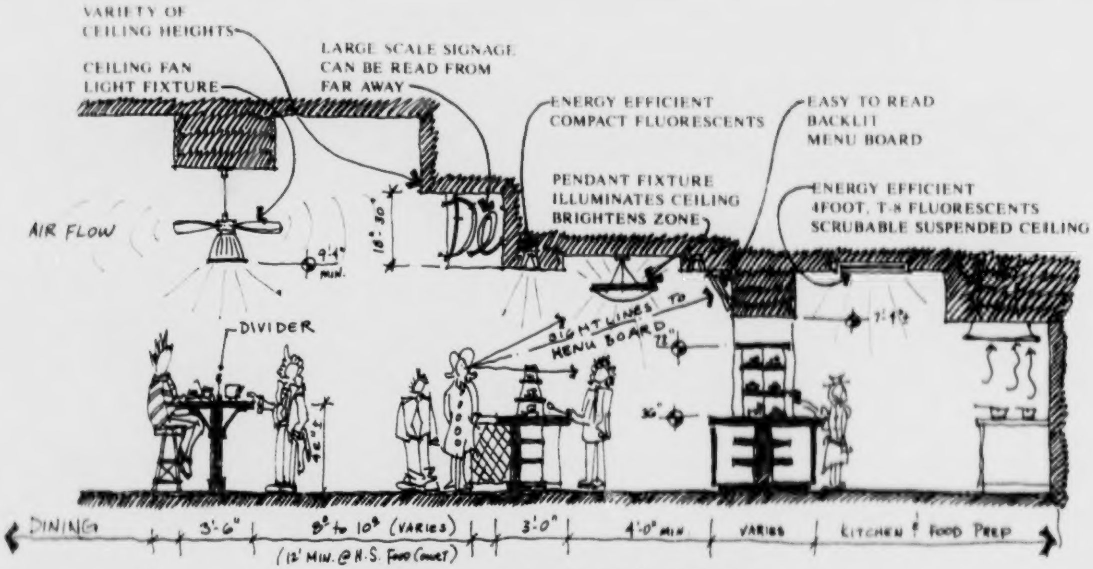
Utilize materials which serve multiple functions:

- Ceramic tile introduces color and pattern making opportunities; highly durable wall or floor finish, economical

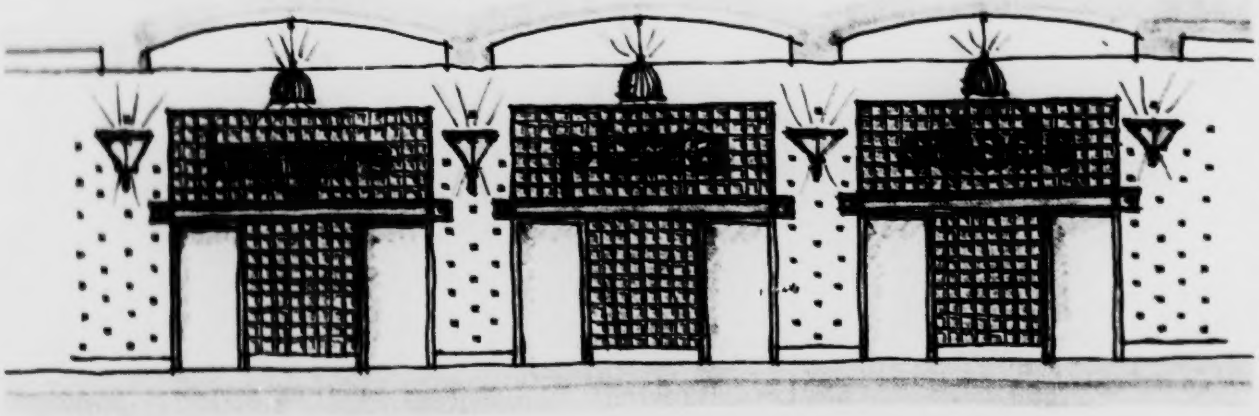


1. STACKING AREAS AND AISLEWAYS
2. SERVING AREAS
3. KITCHEN PREPARATION AREA
4. TRAY RETURN AT DISHWASH/ RECYCLE
5. CASHIER
6. SEATING / COUNTER
7. DINING AREA
8. TRASH / RECYCLE

FUNCTIONAL FLOW DIAGRAM BETWEEN DINING AND SERVING


VARIETY OF CEILING HEIGHTS
CEILING FAN LIGHT FIXTURE
LARGE SCALE SIGNAGE CAN BE READ FROM FAR AWAY
ENERGY EFFICIENT COMPACT FLUORESCENTS
EASY TO READ BACKLIT MENU BOARD
PENDANT FIXTURE ILLUMINATES CEILING BRIGHTENS ZONE
ENERGY EFFICIENT 4FOOT, T-8 FLUORESCENTS SCRUBABLE SUSPENDED CEILING
AIR FLOW
9'-4" MIN.
10'-30'
DIVIDER
42"
SIGHTLINES TO MENU BOARD
72"
36"
7'-9½"
DINING
3'-6"
8' to 10' (VARIES)
(12' MIN. @ H.S. FOOD COURT)
3'-0"
4'-0" MIN
VARIES
KITCHEN & FOOD PREP

RETAIL ACTIVITY ZONE



ELEVATION STUDY FROM DINING AT SERVING ENTRY

- Vinyl composition tile introduces color and pattern making opportunities; durable, easily maintained, economical.

- Signage introduces color opportunities and provides necessary information.

- Wood trim and veneer provides natural warmth, compliments man-made materials, durable edge, base, wall, wainscot treatment.

- Mirrors expand spatial qualities and increase sightlines and supervisibility.

G. Kitchen Areas

School food service can be thought of as a manufacturing facility with a retail outlet. The design of a school kitchen must consider two main flows; the flow of the customer through the public spaces and the flow of the food through the working spaces. This flow, as described below, must be maintained to promote an efficient operation.

Food Flow Relationships

- ***Receiving adjacent to loading dock - to receive deliveries of food products at dedicated area or loading dock***

- ***Storage near receiving - to maintain security and maintain proper temperatures of perishable foods***

- ***Production adjacent to storage - to expedite production and have the ingredients where needed, when needed***

- ***Serving adjacent to production - to provide the freshest food to the serving and ease replenishment***

- ***Serving and production adjacent to warewashing - to maintain an efficient cleaning and sanitation program***

- ***Internal trash collection adjacent to or part of the warewashing - to maintain an efficient sanitation program and avoid cross contamination***

- ***Trash removal near the back door - to facilitate trash removal and avoid production areas***

- ***Recycling area near trash to encourage participation in recycling programs***

- ***Windows near receiving, trash and recycle areas, if possible, to improve morale of food service employees and improve security by increasing visibility of those outside areas***

Customer relationships:

- ***Serving easily accessible to entrance to speed and simplify the customers' access to the serving area***

- ***Serving adjacent to the dining area for ease and convenience of the customers***

- ***Warewashing adjacent to the dining area to encourage the students to remove their dishes easily to the warewashing area***

- ***Exit near warewashing to facilitate orderly departure from space for crowd control***

Staffing:

Efficient staffing is a very important factor in school food service design. Although this manual is not intended to outline staffing guidelines, the following staffing principles have been used in the development of the prototypes and should be considered in the development of the food service programs.

- The principle of critical period staffing is used. Critical period staffing provides the largest number of staff members at the time most needed. The critical period for school food service is during the serving time for lunch.
- The number of staff members needed during preparation and clean-up is fewer, so staff schedules are projected backwards for preparation and forward for cleanup.
- Staff levels are reduced for satellite schools since the preparation labor takes place at the preparation site. Part-time staff can be utilized at satellite schools.
- Staff sizes control the area that should be dedicated to locker space, changing space, and toilet rooms.
- Staff sizes also affect the area required for office space by food service management. Office sizes will also vary with food service program type and school type.

H. General Considerations

Acoustics: Sound transmission and absorption can be controlled through major design decisions such as physical adjacencies, volumetric shapes, and material selections.

- ***Acoustic control begins with initial schematic design concepts.*** Sound transmission can best be controlled by room adjacency relationships. The dining area will be a noise source at times and because of this it requires sound isolation from adjacent quiet areas. This may be achieved by requiring physical separation at the basic programming level.
- ***Key views into and out of the dining area*** should be maintained as required for security and observation purposes, but the remainder of perimeter interior wall areas should be acoustically isolated from adjacent program areas.
- ***Place program buffer areas such as*** storage rooms, toilet rooms, school stores, utility closets, janitor's closets, ticket booths, etc., between the dining area and adjacent programs.
- ***Where programmatic isolation is not feasible***, refer to *Architectural Graphic Standards* for Sound Transmission Coefficient (STC) rated partitions which are recommended for isolating different room types.
- ***Room shapes are also important factors in acoustic design.*** Acoustic analysis of

various volumetric shapes will reveal reverberation times and whether sound is being focused at any particular location. Non-parallel walls can reduce reverberation problems.

- ***Certain shapes can focus sound and amplify decibel levels*** dramatically in particular areas. This can be very disruptive in an educational environment, even a cafeteria. Use of sound baffles or acoustic dampers can control this phenomenon. Acoustic analysis and design is very important in dining areas, especially those which serve also as auditoriums.

- ***Noise reduction*** works best when noise is eliminated or controlled at its source. Employ high performing noise reduction, sound absorbing, material as close to the sound source as possible in order to control it. However, floors and low wall areas are the closest surfaces to noise sources and they tend to be made of hard, durable, easy to maintain materials which offer little opportunity for sound absorption. Therefore, maximize use of available upper wall areas and ceiling surfaces for placement of acoustic wall panels and acoustic ceiling tiles. Noise reduction coefficients (NRC rating) of .50 to .75 are economically available in these products.

Lighting: Lighting levels, aesthetics, energy consumption, and the ease of re-lamping are primary design issues which can be addressed in the lighting design and fixture selection.

- ***Illumination levels in a dining area will depend upon the specific uses of the space.*** For instance, dining uses require a 30 foot candle illumination level, while testing uses require a 50 foot candle illumination level (compared to a typical classroom's 70 foot candle level). Theatrical uses require a wide range of illumination levels (from completely darkened to 5 foot candles to 50 foot candles) which is usually accomplished through dimming controls.

- ***Illumination levels should be designed*** in accordance with current *Illumination Engineer's Society Lighting Handbook* standards, American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) / Illumination Engineer's Society of North America (IES) standard 90.1, 1989, *Energy Efficient Design of New Buildings Except Low-Rise*, State of Maryland Energy Conservation Guidelines for State Buildings, and any applicable local code requirements.

- ***Pendant mounted fluorescent light fixtures*** can provide direct down lighting for dining and some up lighting for ceiling plane illumination. These energy efficient fixtures can be specified with dimmable electronic ballasts and can provide a multitude of lighting levels.

- ***Recessed dimmable compact fluorescent fixtures*** can be employed to create different "scenes" or provide "mood" lighting for special activities. These energy efficient fixtures must be specified with dimmable electronic ballasts.

- ***Separate switching of different fixtures*** can increase flexibility of lighting scenarios, maximize energy efficiency, and minimize operating costs.

- ***Color and temperature of lamp light source*** should be appropriate for dining , food displays, and assembly functions. Lamp life, availability and cost of re-lamping should be considered when selecting color and temperature of light source.

- ***A variety of light fixture housings can enliven the design,*** however, the number of different lamp types should be minimized to facilitate maintenance and re-lamping.

- ***Care should be taken to select energy efficient and long life-span lamp types,*** such as T-8 fluorescent with electronic ballasts and dimmers, compact fluorescents, and color corrected metal halides. Incandescent light sources should be used sparingly, if at all.

Mechanical, Electrical and Fire Protection Considerations:

The dining area is also a multimedia instruction and assembly space. It should be well ventilated, pleasant and free of odors. The space should provide for the use of computers in several locations. Outlets for voice, data, video, and power will allow for future multimedia use in providing nutrition education and other activities.

Mechanical, electrical, smoke control, fire detection, and alarm systems should be designed in consultation with the owner, the Mechanical/Electrical/Plumbing (MEP) engineer, the food services designer, and the architect. The design team for these systems should consider the following:

- Heating, Ventilating and Air Conditioning (HVAC) systems should be designed and installed in accordance with ASHRAE 62 - *Ventilation for Acceptable Indoor Air Quality,* and NFPA 90A, *Installation of Air Conditioning and Ventilating Systems* or NFPA 90B, *Installation of Warm Air Heating and Air Conditioning Systems*, as applicable.

- Electrical systems should be designed and installed in accordance with NFPA 70, *National Electrical Code.*

- Equipment utilizing gas and related gas piping should be designed and installed in accordance with NFPA 54, *National Fuel Gas Code,* or NFPA 58, *Standard for Storage and Handling of Liquefied Petroleum Gases.*

- Ventilating or heat-producing equipment should be designed and installed in accordance with NFPA 91, *Standard for Exhaust Systems for Air Conveying of Materials;* NFPA 211, *Standard for Chimneys, Fireplace,* *Vents, and Solid Fuel-burning Appliances;* NFPA 31, *Standard for Installation of Oil-burning Equipment;* NFPA 54, *National Fuel Gas Code;* NFPA 70, *National Electrical Code*, as applicable.

- Commercial cooking equipment should be designed and installed in accordance with NFPA 96, *Standard on Ventilation Control and Fire Protection of Commercial Cooking Operations.*
- Smoke control systems should be designed and installed in accordance with NFPA 92 A, *Recommended Practice for Smoke-Control Systems*, NFPA 92 B, *Guide for Smoke Management Systems in Malls, Atria, and Large Areas,* NFPA SPP-53, *Smoke Control in Fire Safety Design*, by Butcher and Parnell, and *ASHRAE Handbook and Product Directory-Fundamentals*.
- Rubbish chutes and incinerators should be designed and installed in accordance with NFPA 82, *Standard on Incinerators and Waste and Linen Handling Systems and Equipment*.
- Fire detection, alarm and communication systems should be designed in accordance with the requirements of Life Safety Code/ NFPA 101, BOCA, and all applicable local building codes and regulations.

Security Considerations: Security includes the protection of people, cash, merchandise, equipment and supplies. Theft in any form represents a loss of revenue and is of concern. Theft tends to occur in three areas in the food service industry: money thefts, food pilferage, and collusion between employees and purveyors. Good school food service design can help prevent theft of money and food, but cannot prevent collusion. Some design considerations are:

- ***Provide a safe and securable environment.*** Receiving and loading dock area should be supervisable from an interior location.
- ***Provide adequate sightlines throughout the kitchen, storage, and receiving areas.*** Minimize nooks and crannies in the layout of spaces. Consider use of convex mirrors for views around corners in vulnerable locations.
- ***Provide adequate room for a safe*** in the manager's office or plan to remove the cash every day to a secure location.
- ***Provide storage areas separately keyed*** from the rest of the school to prevent any unauthorized access by school personnel.
- ***Design serving areas to prevent student pilferage.*** Consider use of low railings or glass partitions to separate students in serving areas from students in seating areas. Most student theft takes place in between the serving lines and the seating areas of the dining room.

I. Guidelines Checklist

This *Guidelines Checklist* is to be used by architects, planners, food service consultants, food service managers, MSDE representatives and planning committee members as a working tool through the project. This checklist can be used to record actions taken and to prompt actions needed to be taken.

ACTION TAKEN	**Goals of Foodservice**
☐	Identify nutrition requirements
☐	Identify education requirements
☐	Identify approach to increase participation
	Number of Users
☐	Grades of school
☐	Population
☐	Current average daily participation of students
☐	Approximate number of students bringing bag lunches
☐	Average daily participation of faculty
☐	Current percentage of meals served free or at a reduced price
	Operations
☐	Meals to be served at planned facility
☐	"A la carte"
	Menu
☐	Complete cycle menu and "a la carte" menu
☐	Portion sizes of "a la carte" items
☐	Degree of choice
☐	Popularity of items by past participation and choice
☐	Food preference, marketing or focus group results about menu

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ACTION TAKEN

Purchasing

- ☐ Policies and procedures
- ☐ USDA Commodities received, types, frequency, pack, etc.
- ☐ Degree of convenience food purchased
- ☐ Current storage limitations that affect purchasing practices

Receiving and Storage

- ☐ Meat
- ☐ Fresh Produce
- ☐ Frozen
- ☐ Groceries
- ☐ Bread
- ☐ Milk
- ☐ Paper
- ☐ Janitorial Supplies

Food Production

- ☐ Standardized recipe system used
- ☐ Degree of batch cooking used
- ☐ Vegetable cleaning and preparation
- ☐ Cooking
- ☐ Baking (if performed)
- ☐ Salad Making
- ☐ Specialty areas (pizza, grill items, etc.)

ACTION TAKEN	**Serving**
☐	Type, sizes and manufacturers of permanent ware or disposables
☐	Degree of self service desired
☐	Type of serving line or system
☐	Condiment dispensing
☐	Salad bar and other remote stations
☐	Menu boards
☐	Cashiering and point of sale system
	Dining
☐	Number and type of meal periods
☐	Seating capacity desired
☐	Other anticipated uses of the dining area
☐	Types of tables and seating
☐	Floor treatment
☐	Wall treatments, graphics, artwork, etc.
☐	Lighting
☐	Windows and treatments
☐	Nutrition education opportunities
☐	Staff dining
☐	Public address, music and video

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ACTION TAKEN

Warewashing and Sanitation

- ☐ Type of warewashing
- ☐ Type of dishware
- ☐ Pot washing
- ☐ Trash removal
- ☐ Energy conservation
- ☐ Recycling

Employee Facilities

- ☐ Toilet facilities
- ☐ Lockers and locker rooms
- ☐ Time clock
- ☐ Dining and/or break rooms

Office Facilities

- ☐ Number of office employees
- ☐ Records stored
- ☐ Security for money

Relationship to Other Activities

- ☐ Accessible for after hours use
- ☐ Define recreational, theatrical and instructional uses

ACTION TAKEN	**Spatial Requirements**
☐	Net areas for equipment and seating plus circulation areas and aisles
☐	Storage and support areas such as toilet rooms and janitor's closet
	Acoustical Needs of Dining and Kitchen
☐	Acoustically separated from quiet program areas
☐	Sound absorption material utilized
	Furniture and Equipment
☐	Ergonomically sized for education level
☐	Compatible with school facility's maintenance and operations
	Other Items for Consideration:
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	

CHAPTER IV: PROTOTYPICAL KITCHEN AND SERVING AREA PLANS AND EQUIPMENT SCHEDULES

A. Introduction

The area required for a school food and nutrition services facility will vary with the school type: elementary, middle, or high school. The area will also vary with the kitchen type: satellite kitchen, on-site kitchen, or base kitchen.

The satellite kitchen requires the least area because prepared food is brought to it from an off-site kitchen. Satellite kitchens usually serve small population elementary schools only. The on-site kitchen is the most common type, where food is prepared on-site for on-site consumption. The largest program area is required by a base kitchen operation, where food is prepared on-site for on-site and off-site consumption. Thus, a base kitchen requires larger food storage and preparation areas, as well as larger receiving, service, and loading/shipping areas.

The area required for a food service facility will also vary considerably with the facility's approach to serving. The number of serving lines required will have the greatest effect on the serving area required because floor area and equipment are required for each serving line.

Another significant factor is whether the serving line equipment is fixed-in-place (permanent) or moveable. Permanent equipment requires dedicated area while moveable serving equipment can utilize shared area. For instance, moveable ice cream carts and cashier stands can be set-up in the dining area adjacent to the permanent serving line area, thus, utilizing shared area during lunch periods. Because these components are moveable, they can be moved out of the dining space and into the kitchen or serving area when meals are not being served.

A food court approach to serving will also combine the serving area with the dining area. However, in the case of a food court, it is recommended that the dining area net square footage be increased to allow for the larger serving area required by a food court. Thus, area is not actually shared as when mobile serving equipment is used.

Kitchen and serving net areas for school food service facilities will depend upon the following design determinants:

- ***school type - elementary, middle or high school***
- ***school population - number of meals to be served***
- ***kitchen type - satellite, on-site, or base kitchen***
- ***number of meal periods***
- ***serving approach - number of serving lines and traditional, fixed equipment or traditional, fixed and moveable equipment, or food court style serving***
- ***storage requirements - dry, refrigerated, and frozen storage areas***

vary with food/nutrition service program and menus

- ***receiving/loading dock area requirements** - vary with kitchen type and storage requirements*
- ***waste/recycling areas** - vary with individual food service program's approach to waste management*

B. High School Food Courts

The food court concept is appealing because it can successfully compete with off-campus, commercial food service operations. Student participation in the school food service program may be increased through the implementation of the food court concept. Students are attracted to the variety of available foods, shorter serving lines, and the appealing dining (i.e. less institutional) atmosphere.

A food court is a collection of branded concept food service operations, where each individual operation has a distinct identity, menu, and visual appeal. Many school food and nutrition services programs have been successful in developing food courts with locally (rather than nationally) branded products.

Increased participation in the school food service program will lead to the nutrition and education outcomes identified earlier in Chapter I. At an open campus high school, serious consideration should be given to employing the food court concept, especially if student participation in the existing food service program is low.

The decision to develop and operate a food court requires considerable evaluation. The following should be given consideration during design:

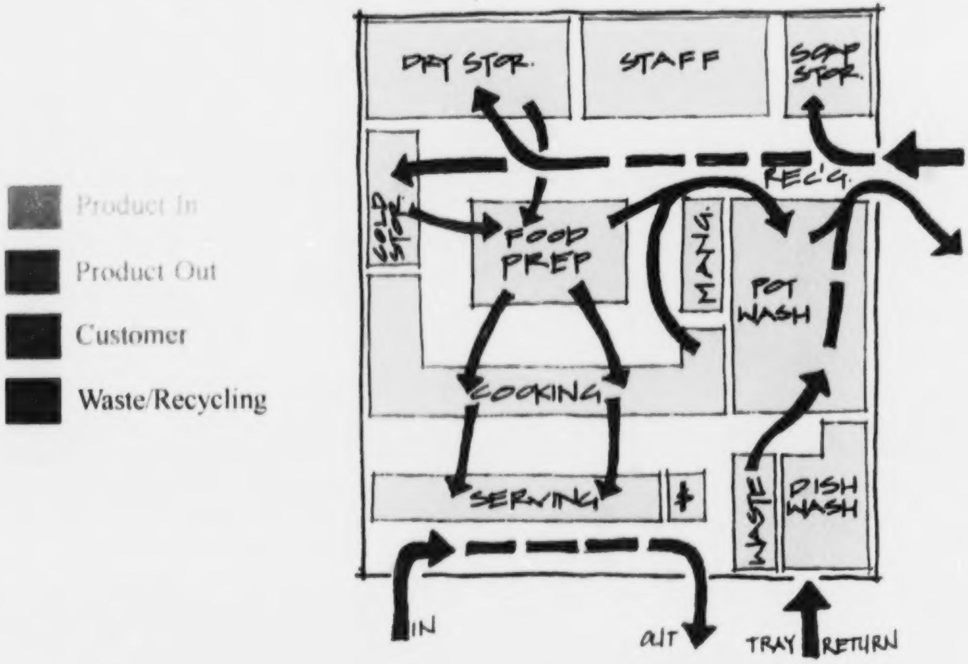
- ***Food courts can improve food service participation.*** Increased sales, coupled with controlled costs, lead to improved profits.
- ***Successful food courts require good design and effective management.*** The potential sales of a food court must be compared to the current sales in the existing program. The expectations of current and potential students may be assessed through the use of surveys and focus groups.
- ***Utilizing a food court*** type of program requires coordination of the food service program with the serving and dining area areas. The food court concept requires appropriate design energy (discussed extensively in Chapter III) to fully realize the potential of this concept.
- ***School food and nutrition service programs*** can obtain valuable nutrition and education outcomes from this approach. Additionally, the school's atmosphere as a whole can benefit from this progressive design philosophy.

C. Prototypes for Elementary, Middle and High Schools

This section illustrates five prototypical approaches to kitchen and serving areas in schools. Flow diagrams illustrate the processes of: receiving, storing, food preparation, serving and waste/ recycling for each prototype. Scale plans depict equipment with required aisles and clearances, keyed to a food service equipment schedule.

1. Satellite Elementary School

The satellite kitchen is commonly utilized in schools with small populations. Food preparation and production occurs off-site in a base kitchen at another facility. The prepared food is then shipped to the satellite kitchen where there must be ample area to unload and receive the food. Provide ample staff and area for reheating equipment, food setup, food serving, and cleanup. The following prototype shows the plan and equipment for a Satellite Elementary School of up to 400 students. The net square footage range for a facility of this type is 1060 - 1120 net s.f.

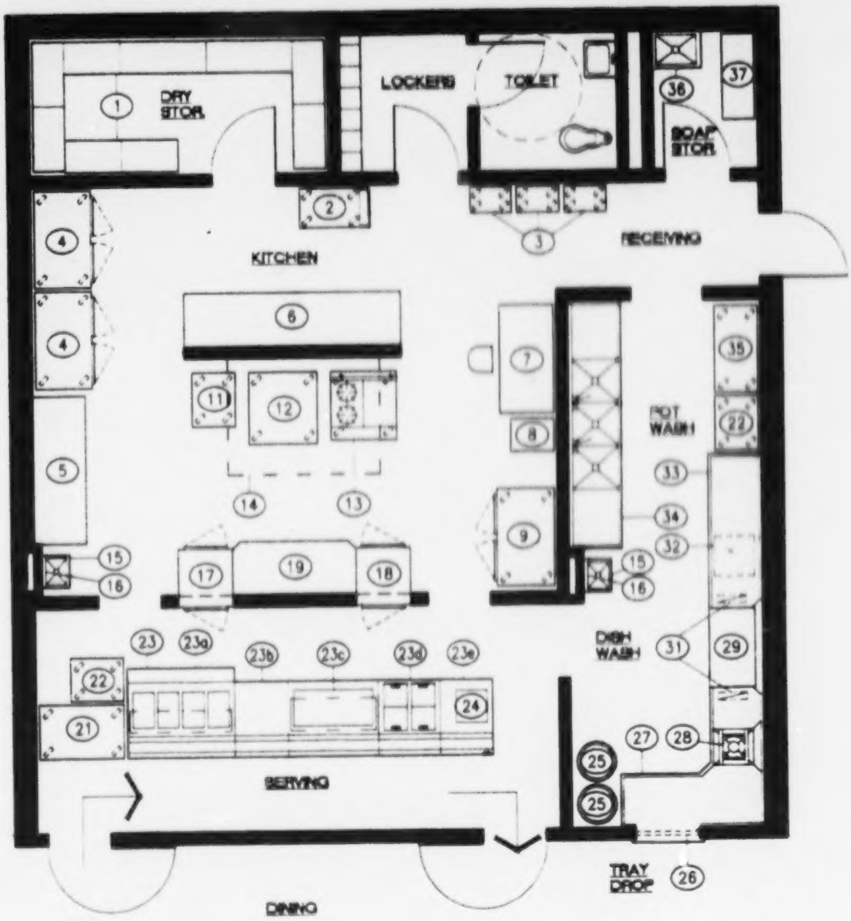

Product In
Product Out
Customer
Waste/Recycling
DRY STOR.
STAFF
SOAP STOR.
REC'G.
COLD STOR.
FOOD PREP
MANG.
POT WASH
COOKING
SERVING
WASTE
DISH WASH
IN
OUT
TRAY RETURN

SATELLITE ELEMENTARY SCHOOL

EQUIPMENT SCHEDULE

for a Satellite Elementary School

NO.	QTY.	DESCRIPTION
1	9	SHELVING, MOBILE
2	3	UTILITY CART, MOBILE
3	3	TRANSPORT CART, MOBILE
4	2	REFRIGERATOR, MOBILE
5	1	WORKTABLE
6	1	WORKTABLE
7	1	DESK & CHAIR
8	1	FILE CABINET
9	1	FREEZER, MOBILE
11	1	PAN RACK CART, MOBILE
12	1	CONVECTION OVEN, MOBILE
13	1	RANGE, MOBILE
14	1	VENTILATOR
15	2	HAND SINK
16	2	SOAP & TOWEL DISPENSER
17	1	REFRIGERATOR, PASS-THRU
18	1	WARMING CABINET, PASS-THRU
19	1	WORKTABLE
21	1	MILK COOLER, MOBILE
22	2	TRAY DISPENSER, MOBILE
23	1	HOT FOOD SERVING COUNTER
23a.	1	HOT FOOD COUNTER
23b.	1	SOLID TOP COUNTER
23c.	1	COLD FOOD COUNTER
23d.	1	ICE CREAM CABINET
23e.	1	CASHIER STAND
24	1	CASH REGISTER
25	2	TRASH CONTAINER, MOBILE
26	1	ROLLING DOOR
27	1	SOILED DISHTABLE
28	1	DISPOSER
29	1	DISH MACHINE
31	2	VENT DUCT
32	1	BOOSTER HEATER
33	1	CLEAN DISHTABLE
34	1	POT WASHING SINK
35	1	POT AND PAN RACK, MOBILE
36	1	MOP SINK & RACK
37	1	SHELVING


DRY STOR.
LOCKERS
TOILET
SOAP STOR
KITCHEN
RECEIVING
POT WASH
DISH WASH
SERVING
DINING
TRAY DROP
1
2
3
4
4
5
6
7
8
9
11
12
13
14
15
16
17
18
19
15
16
22
21
23
23a
23b
23c
23d
23e
24
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36
37

SATELLITE ELEMENTARY PROTOTYPE PLAN

Not shown for clarity:

- Windows in kitchen work area
- Interior windows, hollow metal frames, or glass block between serving and dining
- Exterior trash room

2. On-Site Elementary School

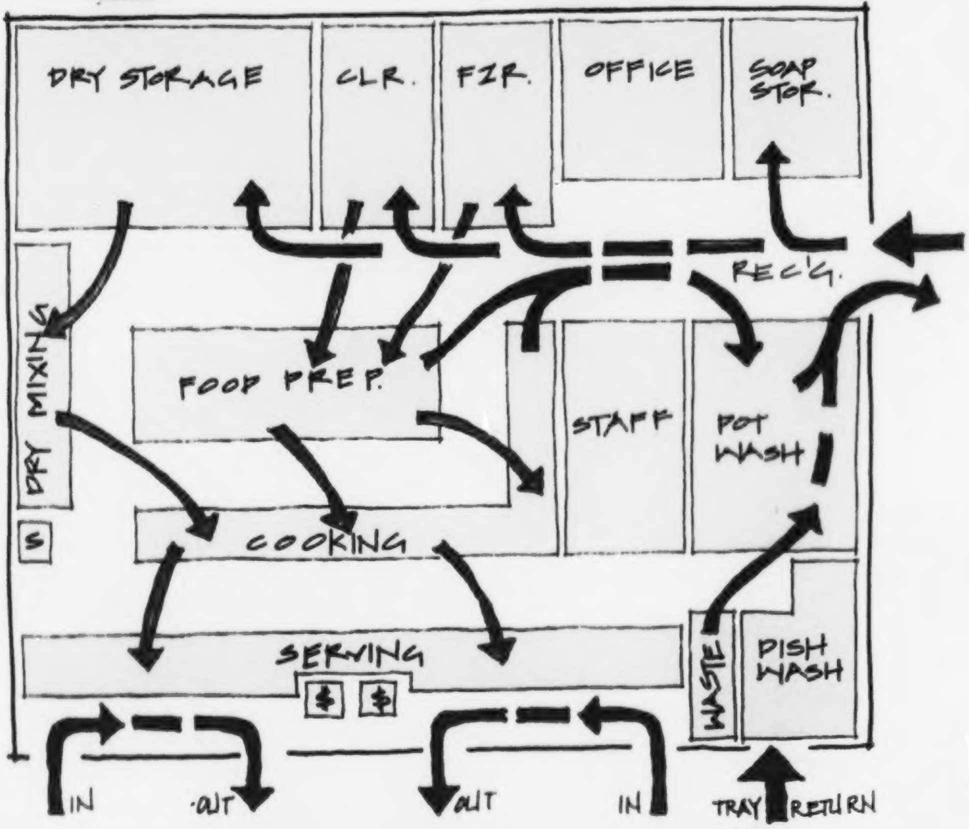
Currently, the traditional cafeteria with two serving lines is the most common type of food and nutrition service used in elementary schools. The On-Site Elementary school is equipped to prepare foods from scratch and is staffed to provide full production, serving and cleanup. During serving time, only limited production is performed. The following prototype shows the plan and equipment for an On-Site Elementary school of up to 700 students. The net square footage range for a facility of this type is 1880 - 1980 net s.f.

■ Product In

■ Product Out

■ Customer

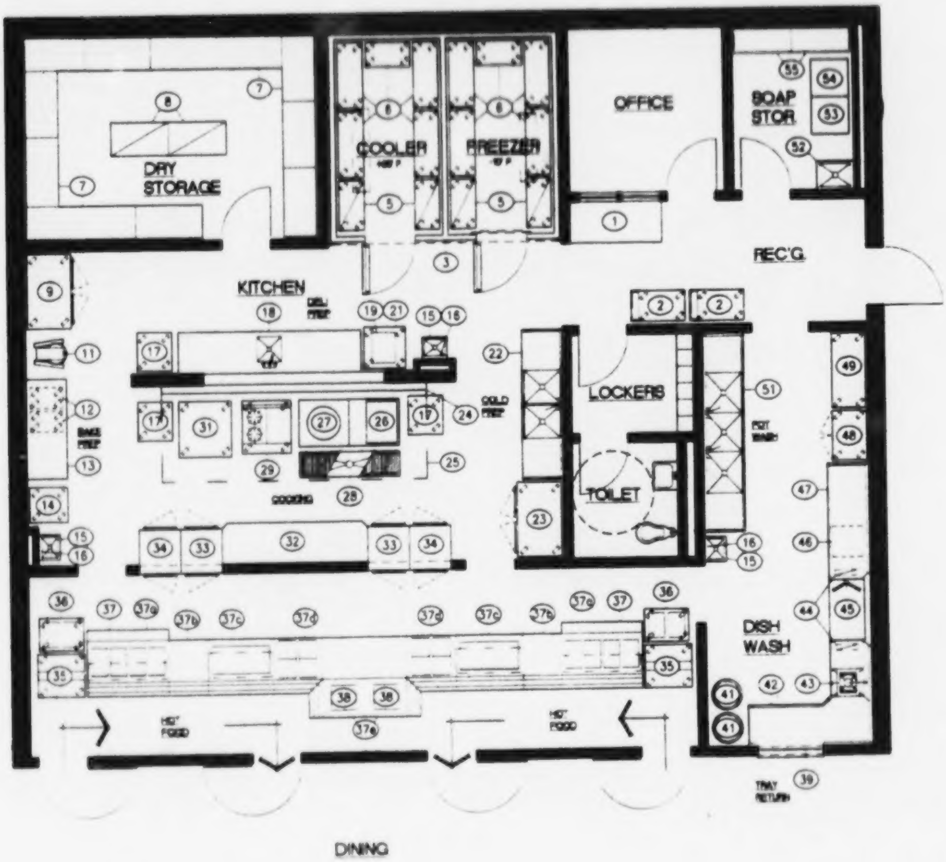
■ Waste/Recycling


DRY STORAGE
CLR.
FZR.
OFFICE
SOAP STOR.
REC'G.
DRY MIXING
FOOD PREP
STAFF
POT WASH
S
COOKING
SERVING
$
$
WASTE
DISH WASH
IN
OUT
OUT
IN
TRAY RETURN

ON-SITE ELEMENTARY SCHOOL

EQUIPMENT SCHEDULE
For an On-Site Elementary School

NO.	QTY.	DESCRIPTION
1	1	RECEIVING TABLE
2	2	UTILITY CART, MOBILE
3	1	WALK-IN COOLER/FREEZER
4	1	REFRIGERATION SYSTEM
5	4	DUNNAGE RACK, MOBILE
6	10	SHELVING, MOBILE
7	12	SHELVING
8	2	DUNNAGE RACK, MOBILE
9	1	REFRIGERATOR, MOBILE
10	-	SPARE NUMBER
11	1	MIXER, 30-QUART
12	2	INGREDIENT BIN, MOBILE
13	1	BAKER'S TABLE
14	1	HOT/PROOF CABINET, MOBILE
15	3	HAND SINK
16	3	SOAP & TOWEL DISPENSER
17	3	PAN RACK CART, MOBILE
18	1	WORKTABLE WITH SINK
19	1	SLICER
20	-	SPARE NUMBER
21	1	SLICER STAND, MOBILE
22	1	PREP SINK
23	1	FREEZER, MOBILE
24	1	UTILITY RACEWAY
25	1	VENTILATOR
26	1	CONVECTION STEAMER
27	1	TILTING KETTLE, 40-GALLON
28	1	FLOOR TROUGH
29	1	RANGE, MOBILE
31	1	CONVECTION OVEN, MOBILE
32	1	WORKCOUNTER
33	2	REFRIGERATOR, PASS-THRU
34	2	WARMING CABINET, PASS-THRU
35	2	MILK COOLER, MOBILE
36	3	TRAY DISPENSER, MOBILE
37	2	SERVING COUNTER
a.	2	HOT FOOD COUNTER
b.	2	SOLID TOP COUNTER
c.	2	COLD FOOD COUNTER
d.	2	SOLID TOP COUNTER
e.	2	CASHIER STAND
38	2	CASH REGISTER
39	1	ROLLING DOOR
40	-	SPARE NUMBER
41	2	TRASH CONTAINER, MOBILE
42	1	SOILED DISHTABLE
43	1	DISPOSER
44	2	VENT DUCT
45	1	DISH MACHINE
46	1	BOOSTER HEATER
47	1	CLEAN DISHTABLE
48	1	STORAGE CABINET, MOBILE
49	1	POT & PAN SHELVING, MOBILE
50	-	SPARE NUMBER
51	1	POT WASHING SINK
52	1	MOP SINK & RACK
53	1	WASHER
54	1	DRYER
55	2	SHELVING


DRY STORAGE
COOLER
FREEZER
OFFICE
SOAP STOR
REC'G
KITCHEN
DELI PREP
COLD PREP
BAKE PREP
COOKING
LOCKERS
TOILET
POT WASH
DISH WASH
HOT FOOD
HOT FOOD
TRAY RETURN
DINING

ON-SITE ELEMENTARY PROTOTYPE PLAN

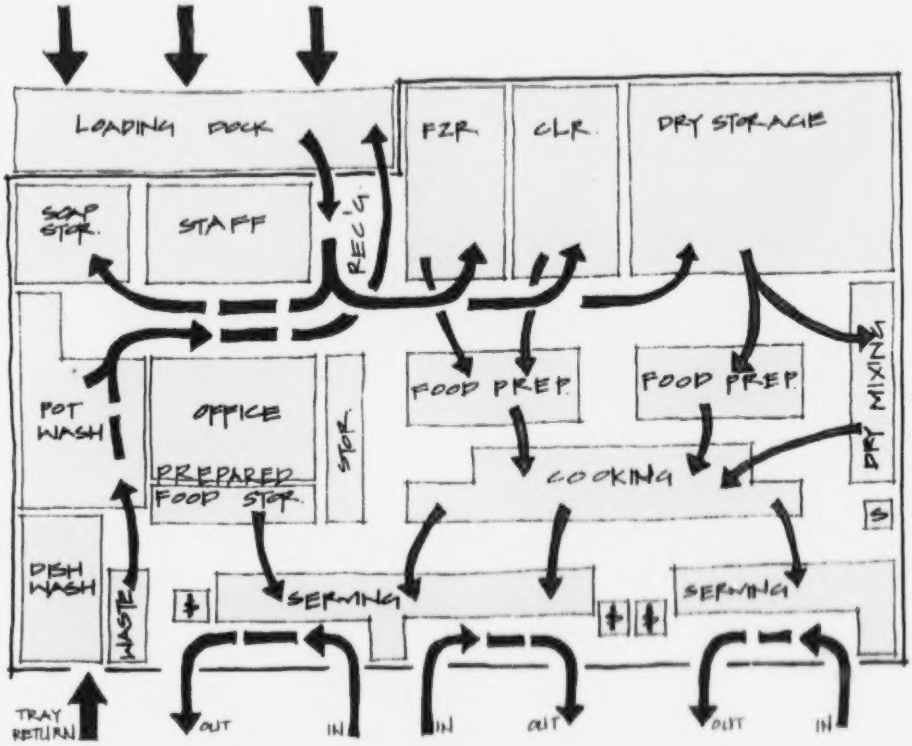
Not shown for clarity:

- Windows in kitchen work area
- Interior windows, hollow metal frames, or glass block between serving and dining
- Exterior trash room

3. On-Site Middle School

The typical middle school layout is a traditional cafeteria with two hot food serving lines and one *a la carte* line. The On-Site Middle School is equipped to prepare foods from scratch and is staffed to provide full production, serving, and cleanup. During serving time, some production is performed to replenish the serving lines. The following prototype shows the plan and equipment for the On-Site Middle School for up to 900 students. The net square footage range for a facility of this type is 2295-2435 net s.f.

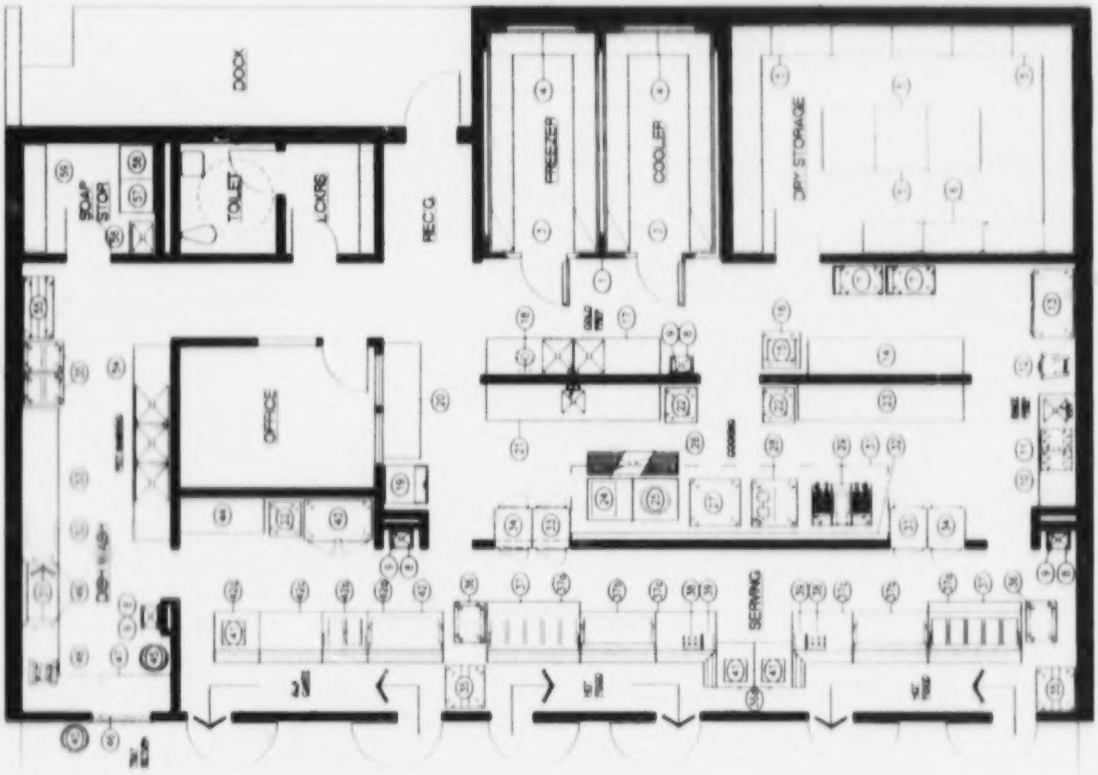
■ Product In
■ Product Out
■ Customer
■ Waste/Recycling


LOADING DOCK
FZR.
CLR.
DRY STORAGE
SOAP STOR.
STAFF
REC'G
POT WASH
OFFICE
PREPARED FOOD STOR.
STOR.
FOOD PREP
FOOD PREP
DRY MIXING
COOKING
S
DISH WASH
WASTE
SERVING
SERVING
TRAY RETURN
OUT
IN
IN
OUT
OUT
IN

ON-SITE MIDDLE SCHOOL

EQUIPMENT SCHEDULE
For an On-Site Middle School

NO.	QTY.	DESCRIPTION
1	1	WALK-IN COOLER/FREEZER
2	1	REFRIGERATION SYSTEM
3	4	DUNNAGE RACK, MOBILE
4	16	SHELVING, MOBILE
5	18	SHELVING
6	3	DUNNAGE RACK, MOBILE
7	2	UTILITY CART, MOBILE
8	4	HAND SINK
9	4	SOAP & TOWEL DISPENSER
10	1	BAKER'S TABLE W/SINK
11	2	INGREDIENT BIN, MOBILE
12	1	MIXER, 30-QUART
13	1	REFRIGERATOR, MOBILE
14	1	WORKTABLE
15	1	SLICER
16	1	SLICER STAND, MOBILE
17	1	PREP SINK
18	1	DISPOSER
19	1	ICE MACHINE/BIN
20	1	WORKTABLE
21	1	WORKTABLE WITH SINK
22	2	PAN RACK CART, MOBILE
23	1	WORKCOUNTER
24	1	CONVECTION STEAMER
25	1	TILTING KETTLE, 40-GALLON
26	1	FLOOR TROUGH
27	1	CONVECTION OVEN, MOBILE
28	1	RANGE, MOBILE
29	1	FRYER ASSEMBLY, MOBILE
30	-	SPARE NUMBER
31	1	VENTILATOR
32	1	UTILITY RACEWAY
33	2	REFRIGERATOR, PASS-THRU
34	2	WARMING CABINET, PASS-THRU
35	2	MILK COOLER, MOBILE
36	4	TRAY DISPENSER, MOBILE
37	2	HOT FOOD SERVING COUNTER
a.	2	HOT FOOD COUNTER
b.	2	COLD FOOD COUNTER
c.	2	SOLID TOP COUNTER
d.	2	CASHIER STAND
38	2	SILVERWARE DISPENSER
39	2	NAPKIN DISPENSER
40	-	SPARE NUMBER
41	2	CASH REGISTER
42	1	*A LA CARTE* SERVING COUNTER
a.	1	COLD FOOD COUNTER
b.	1	HOT FOOD COUNTER
c.	1	SOLID COUNTER TOP
d.	1	CASHIER STAND
43	1	REFRIGERATOR, MOBILE
44	1	WORKCOUNTER
45	2	TRASH COUNTER, MOBILE
46	1	ROLLING DOOR
47	1	SOILED DISHTABLE
48	1	DISPOSER
49	2	VENT DUCT
50	-	SPARE NUMBER
51	1	DISH MACHINE
52	1	BOOSTER HEATER
53	1	CLEAN DISHTABLE
54	1	POT WASHING SINK
55	1	POT & PAN SHELVING, TABLE
56	1	MOP SINK & RACK
57	1	WASHER
58	1	DRYER
59	2	SHELVING


DOCK
SOAP STOR
TOILET
LCKRS
REC'G
FREEZER
COOLER
DRY STORAGE
OFFICE
SERVING

ON-SITE MIDDLE SCHOOL PROTOTYPE PLAN

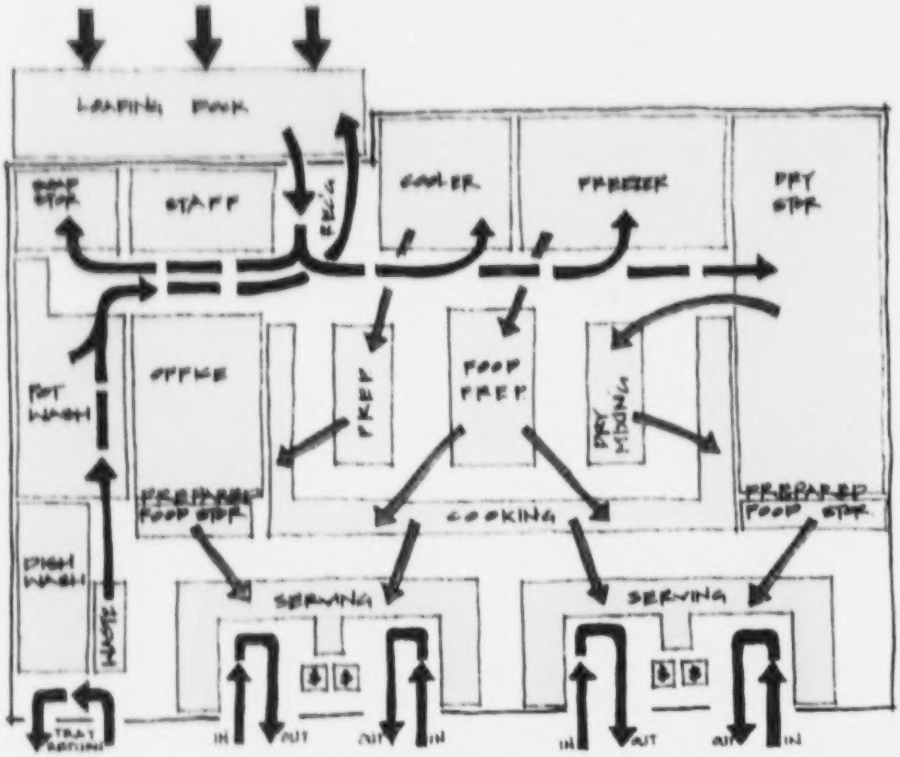
Not shown for clarity:

- Windows in kitchen work area
- Interior windows, hollow metal frames, or glass block between serving and dining
- Exterior trash room

4. On-Site High School

This typical On-Site High School utilizes traditional serving lines. It offers a variety of food options for students - traditional hot food, salads and deli, grille for hamburgers, etc., and pizza line. The On-Site High School is staffed to provide full production, serving, and cleanup. During the serving time, considerable production is performed to replenish the serving lines. The following shows the plan and the equipment for the On-Site High School. This prototype is for a school of 1,400 students. The net square footage range for a facility of this type is 3895 - 3985 net s.f.

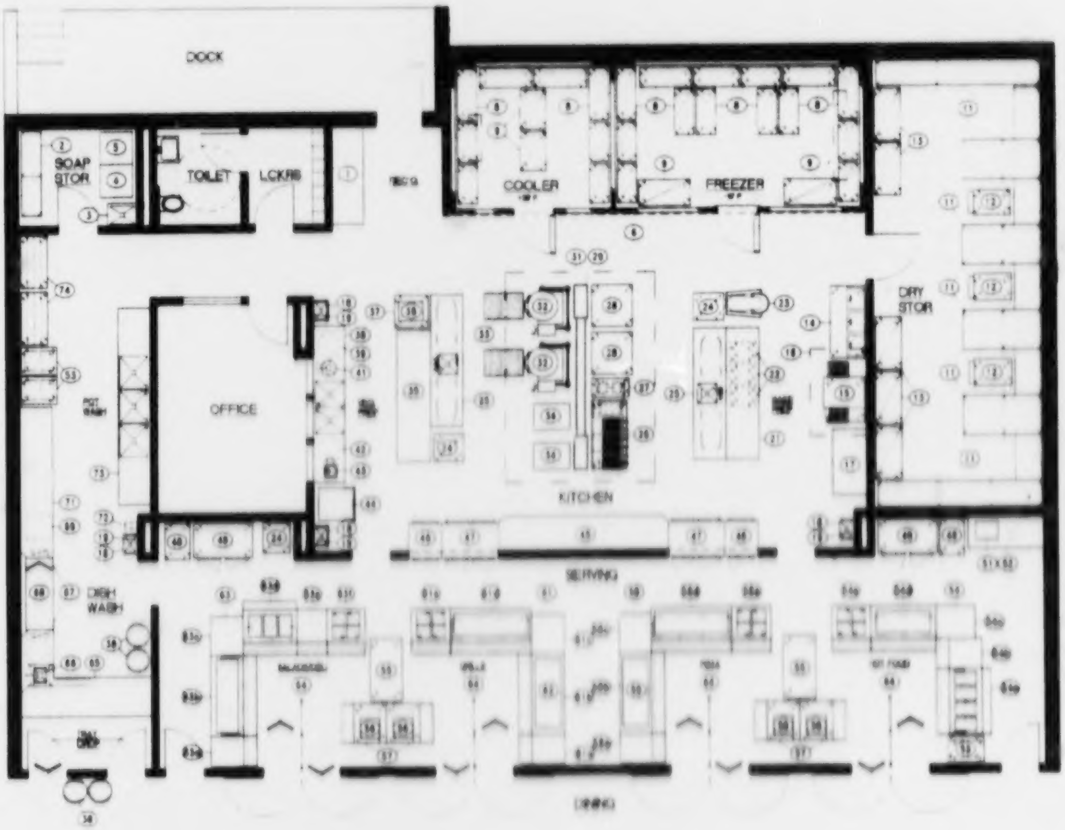
■ Product In
■ Product Out
■ Customer
■ Waste/Recycling


LOADING DOCK
STOR
STAFF
RECYC
COOLER
FREEZER
DRY STOR
OFFICE
PREP
FOOD PREP
DRY MIXING
POT WASH
PREPARED FOOD STOR
PREPARED FOOD STOR
COOKING
DISH WASH
WASTE
SERVING
SERVING
TRAY RETURN
IN
OUT
OUT
IN
IN
OUT
OUT
IN

ON-SITE HIGH SCHOOL

EQUIPMENT SCHEDULE
for an On-Site High School

NO.	QTY.	DESCRIPTION
1	1	RECEIVING TABLE
2	2	SHELVING
3	1	MOP SINK & RACK
4	1	WASHER
5	1	DRYER
6	1	WALK-IN COOLER/FREEZER
7	1	REFRIGERATION SYSTEM
8	22	SHELVING, MOBILE
9	4	DUNNAGE RACK, MOBILE
10	-	SPARE NUMBER
11	19	SHELVING
12	3	UTILITY CART, MOBILE
13	5	DUNNAGE RACK, MOBILE
14	1	PIZZA PREP TABLE, MOBILE
15	1	PIZZA OVEN, MOBILE
16	1	EXHAUST CANOPY
17	1	WORKTABLE
18	4	HANDSINK
19	4	SOAP & TOWEL DISPENSER
20	-	SPARE NUMBER
21	1	BAKER'S TABLE
22	3	INGREDIENT BIN, MOBILE
23	1	MIXER, 60-QT.
24	3	PAN RACK CART, MOBILE
25	2	WORKTABLE
26	1	FRYER ASSEMBLY, MOBILE
27	1	RANGE, MOBILE
28	1	CONVECTION OVEN, MOBILE
29	1	UTILITY RACEWAY
30	-	SPARE NUMBER
31	1	VENTILATOR
32	2	TILTING KETTLE, 40-GAL
33	2	FLOOR TROUGH
34	2	CONVECTION STEAMER
35	1	WORKTABLE
36	1	SLICER
37	1	SLICER STAND, MOBILE
38	1	PREP SINK
39	5	TRASH CONTAINER
40	-	SPARE NUMBER
41	1	DISPOSER
42	1	SALAD MIXING BOWL, MOBILE
43	1	FOOD PROCESSOR
44	1	ICE MACHINE/BIN
45	1	WORKCOUNTER
46	2	WARMING CABINET, PASS-THRU
47	2	REFRIGERATOR, PASS-THRU
48	2	WARMING CABINET, MOBILE
49	2	REFRIGERATOR, MOBILE
50	-	SPARE NUMBER
51	1	MICROWAVE
52	1	WORKCOUNTER
53	3	TRAY DISPENSER, MOBILE
54	1	HOT FOOD SERVING COUNTER
a.	1	HOT FOOD COUNTER
b.	1	SOLID TOP COUNTER
c.	1	CORNER SOLID TOP COUNTER
d.	1	COLD FOOD COUNTER
e.	1	ICE CREAM CABINET
55	2	MILK COOLER, MOBILE
56	4	CASH REGISTER
57	4	CASHIER STAND, MOBILE
58	1	PIZZA SERVING COUNTER
a.	1	SOLID TOP COUNTER
b.	1	SOLID TOP COUNTER
c.	1	CORNER SOLID TOP COUNTER
d.	1	COLD FOOD COUNTER
e.	1	ICE CREAM CABINET
59	1	PIZZA DISPLAY WARMER
60	-	SPARE NUMBER
61	1	GRILLE SERVING COUNTER
a.	1	SOLID TOP COUNTER
b.	1	SOLID TOP COUNTER
c.	1	CORNER SOLID TOP COUNTER
d.	1	COLD FOOD COUNTER
e.	1	ICE CREAM CABINET
62	1	HEATED SANDWICH MERCHAND.
63	1	SALAD/DELI SERVING COUNTER
a.	1	SOLID TOP COUNTER
b.	1	SOLID TOP COUNTER
c.	1	CORNER SOLID TOP COUNTER
d.	1	HOT FOOD COUNTER
e.	1	SOLID TOP COUNTER
f.	1	ICE CREAM CABINET
64	4	RAILING
65	1	SOILED DISHTABLE
66	1	DISPOSER
67	2	VENT DUCT
68	1	DISH MACHINE
69	1	BOOSTER HEATER
70	-	SPARE NUMBER
71	1	CLEAN DISHTABLE
72	1	HOSE REEL SPRAY
73	1	POT WASHING SINK
74	2	POT & PAN SHELVING, MOBILE

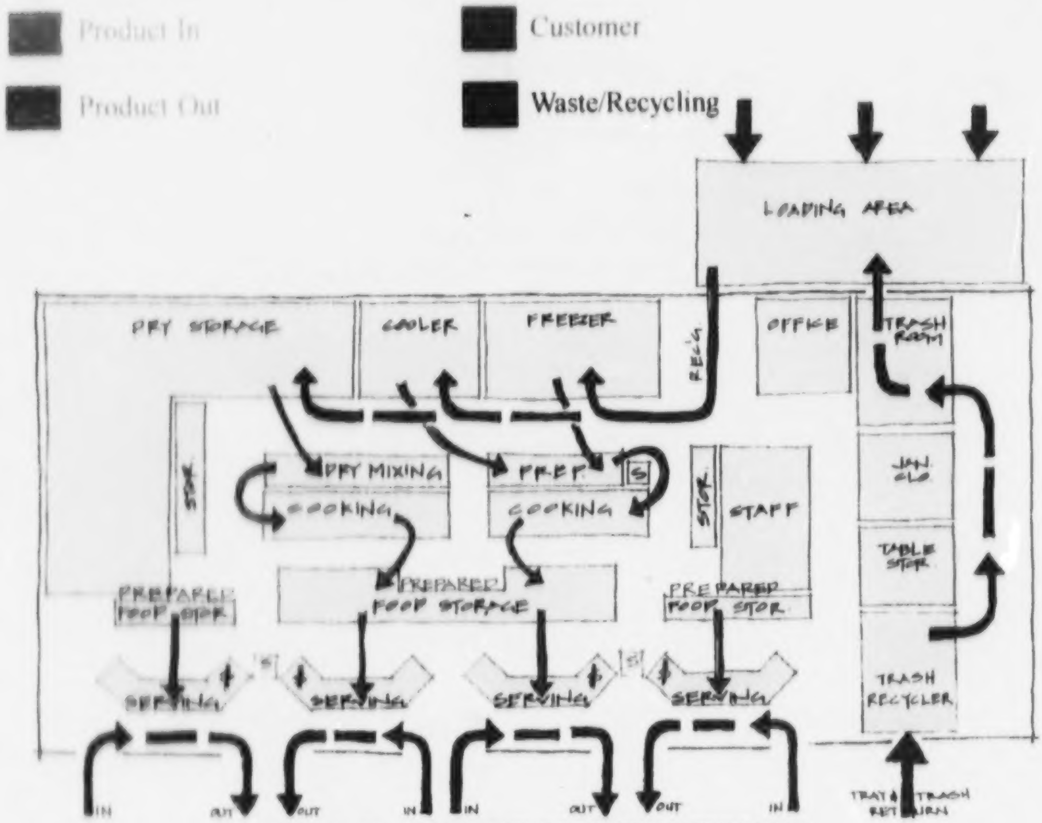

DOCK
SOAP STOR
TOILET
LCKRS
REC'G
COOLER
FREEZER
DRY STOR
OFFICE
POT WASH
KITCHEN
SERVING
DISH WASH
TRAY DROP
DINING

ON-SITE HIGH SCHOOL PROTOTYPE PLAN

Not shown for clarity:
- Windows in kitchen work area
- Interior windows, hollow metal frames, or glass block between serving and dining
- Exterior trash room

5. Food-Court High School

The food-court concept in high schools is a new and exciting development. While the kitchen is similar to the traditional On-Site High School, the serving area is very different. The school is equipped with a serving area similar to food courts found in a shopping mall. The following sketch shows a High School Food-Court. The equipment list for the High School Food-Court is the same as the On-Site High School with the addition of three condiment counters and one serving line. The High School Food-Court is staffed to provide full production, serving and clean-up. During serving time, considerable production is performed to replenish the serving lines. This prototype is for a school of 1,500-1,600 students. The net square footage range for a facility of this type is 4125 - 4225 net s.f.


Product In
Customer
Product Out
Waste/Recycling
LOADING AREA
DRY STORAGE
COOLER
FREEZER
REC'G
OFFICE
TRASH ROOM
STOR
DRY MIXING
COOKING
PREP
S
COOKING
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JAN. CLO
TABLE STOR
PREPARED FOOD STOR
PREPARED FOOD STORAGE
PREPARED FOOD STOR
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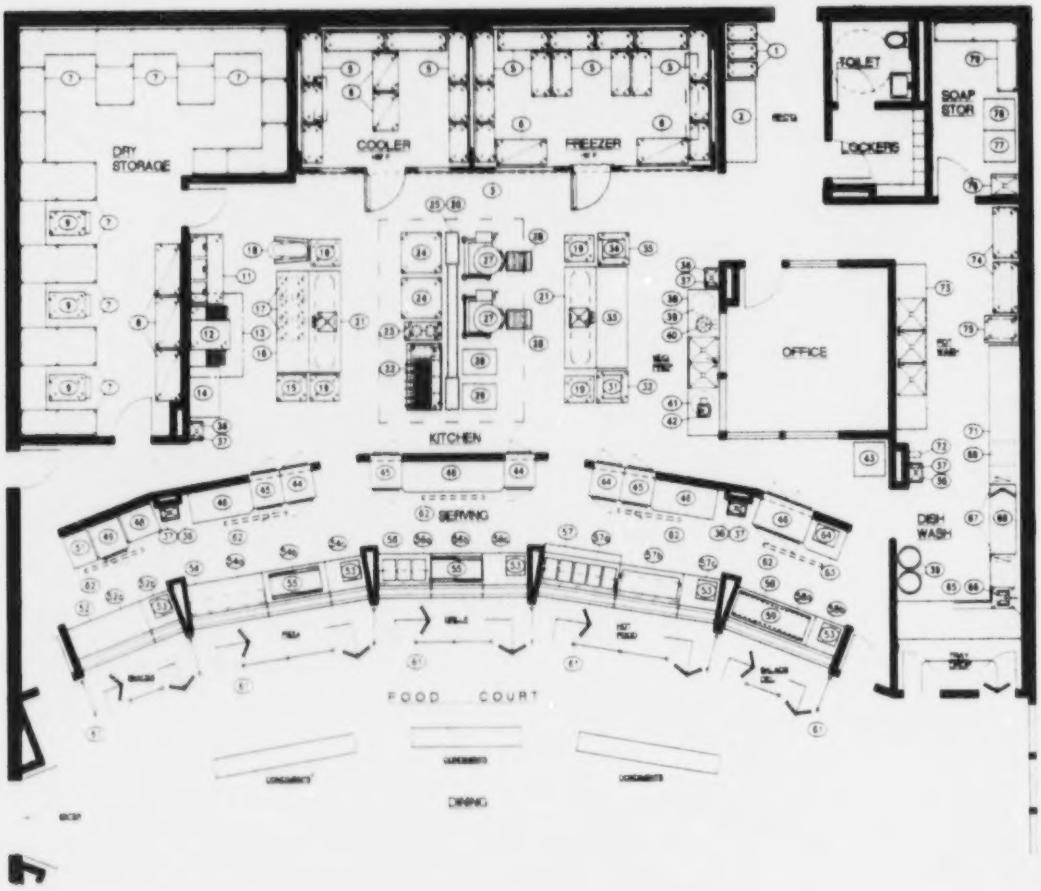
SERVING
SERVING
SERVING
SERVING
TRASH RECYCLER
IN
OUT
OUT
IN
IN
OUT
OUT
IN
TRAY & TRASH RETURN

FOOD COURT HIGH SCHOOL

EQUIPMENT SCHEDULE
for a Food-Court High School

NO.	QTY.	DESCRIPTION	NO.	QTY.	DESCRIPTION
1	3	FOOD TRANSPORT CART, MOBILE	46	4	WORKCOUNTER
2	1	RECEIVING TABLE	47	1	REFRIGERATOR, PAS-THRU
3	1	WALK-IN COOLER/FREEZER	48	1	ICE CREAM CABINET, MOBILE
4	1	REFRIGERATION SYSTEM	49	1	REACH-IN REFRIGERATOR MOBILE
5	22	SHELVING, MOBILE	50	-	SPARE NUMBER
6	4	DUNNAGE RACK, MOBILE	51	1	WARMING CABINET
7	26	SHELVING	52	1	SNACK BAR SERVING COUNTER 3
3		DUNNAGE RACK, MOBILE	a.	1	SOLID TOP COUNTER
9	3	UTILITY CART, MOBILE	b.	1	CASHIER STAND
10	-	SPARE NUMBER	53	5	CASH REGISTER
11	1	PIZZA PREP TABLE, MOBILE	54	1	PIZZA SERVING COUNTER
12	1	PIZZA OVEN, MOBILE	a.	1	HEATED PIZZA DISPLAY COUNTER
13	1	EXHAUST CANOPY	b.	1	SOLID TOP COUNTER
14	1	WORKTABLE	c.	1	CASHIER STAND
15	1	PROOFING CABINET, MOBILE	55	2	PASS-THRU DISPLAY REFRIG.
16	1	BAKER'S TABLE	56	1	GRILLE SERVING COUNTER
17	3	INGREDIENT BIN, MOBILE	a.	1	HOT FOOD COUNTER
18	1	MIXER, 60-QUART	b.	1	SOLID TOP COUNTER
19	4	PAN RACK CART, MOBILE	c.	1	CASHIER STAND
20	-	SPARE NUMBER	57	1	HOT FOOD COUNTER
21	2	WORKTABLE WITH SINK	a.	1	HOT FOOD COUNTER
22	1	FRYER ASSEMBLY, MOBILE	b.	1	COLD FOOD COUNTER
23	1	RANGE, MOBILE	c.	1	CASHIER STAND
24	2	CONVECTION STEAMER	58	1	SALAD/DELI SERVING COUNTER
25	1	UTILITY RACEWAY	a.	1	SOLID TOP COUNTER
26	1	VENTILATOR	b.	1	CASHIER STAND
27	2	TILTING KETTLE, 40-GALLON	59	1	REFRIG. SALAD/DELI MERCHAND.
28	2	FLOOR TROUGH	60	-	SPARE NUMBER
29	2	CONVECTION STEAMER	61	10	MOVEABLE GUIDEROPE
30	-	SPARE NUMBER	62	1	LIGHTED MENU BOARD
31	1	MIXER, 20-QUART	63	1	WORKCOUNTER
32	1	MIXER STAND, MOBILE	64	1	MICROWAVE OVEN
33	1	WORKTABLE	65	1	SOILED DISHTABLE
34	1	SLICER	66	1	DISPOSER
35	1	SLICER STAND, MOBILE	67	2	VENT DUCT
36	5	HAND SINK	68	1	DISH MACHINE
37	5	SOAP & TOWEL DISPENSER	69	1	BOOSTER HEATER
38	1	PREP SINK	70	-	SPARE NUMBER
39	5	TRASH CONTAINER, MOBILE	71	1	CLEAN DISHTABLE
40	1	DISPOSER	72	1	HOSE REEL SPRAY
41	1	SALAD MIXING BOWL, MOBILE	73	1	POT WASHING SINK
42	1	FOOD PROCESSOR	74	2	POT & PAN SHELVING, MOBILE
43	1	ICE MACHINE/BIN	75	2	TRAY/SILVERWARE DISPEN. MOBILE
44	3	REFRIGERATOR, PASS-THRU	76	1	MOP SINK & RACK
45	3	WARMING CABINET, PASS-THRU	77	1	WASHER
			78	1	DRYER
			79	3	SHELVING


DRY STORAGE
COOLER
FREEZER
TOILET
LOCKERS
SOAP STOR
KITCHEN
OFFICE
SERVING
DISH WASH
FOOD COURT
DINING

FOOD COURT HIGH SCHOOL PROTOTYPE PLAN

Not shown for clarity:

- Windows in kitchen work area
- Interior windows, hollow metal frames, or glass block between serving and dining
- Exterior trash room

KEY TO DESIGN CONSIDERATIONS

1. Acoustic Ceiling Tiles: Provide excellent acoustic characteristics (NRC .65 typical) and easy access to mechanical equipment in ceiling plenum above. Minimum light reflectance factor of .75 is recommended. Smooth texture is preferred for dining area finish maintenance. Rough textures eventually show a buildup of dust and/or grease. Suspended ceiling plane can be articulated to create spatial variety and more intimate dining areas within a larger dining volume. Kitchen areas require special cleanable tiles with plastic or fiberglass finish.

2. Lighting: Pendant mounted fixtures provide direct down-lighting for dining and up-lighting of ceiling planes. Recessed dimmable fixtures can be incorporated into drywall bulkheads and provide scene or mood lighting for special events. Color and temperature of lamp light should be as similar to daylight as possible and should be appropriate for dining activity and food displays. A variety of light fixture housings can enliven the design. Minimize number of lamp types to facilitate maintenance. Long life-span lamps, such as metal halides and fluorescents, should be utilized for economy.

3. Signage: Large scale signage should be visible from across the dining area. Neon, fiber optics and other bright and colorful sign media should be considered. Smaller menu display and boards should be changeable and visible from the service counter area.

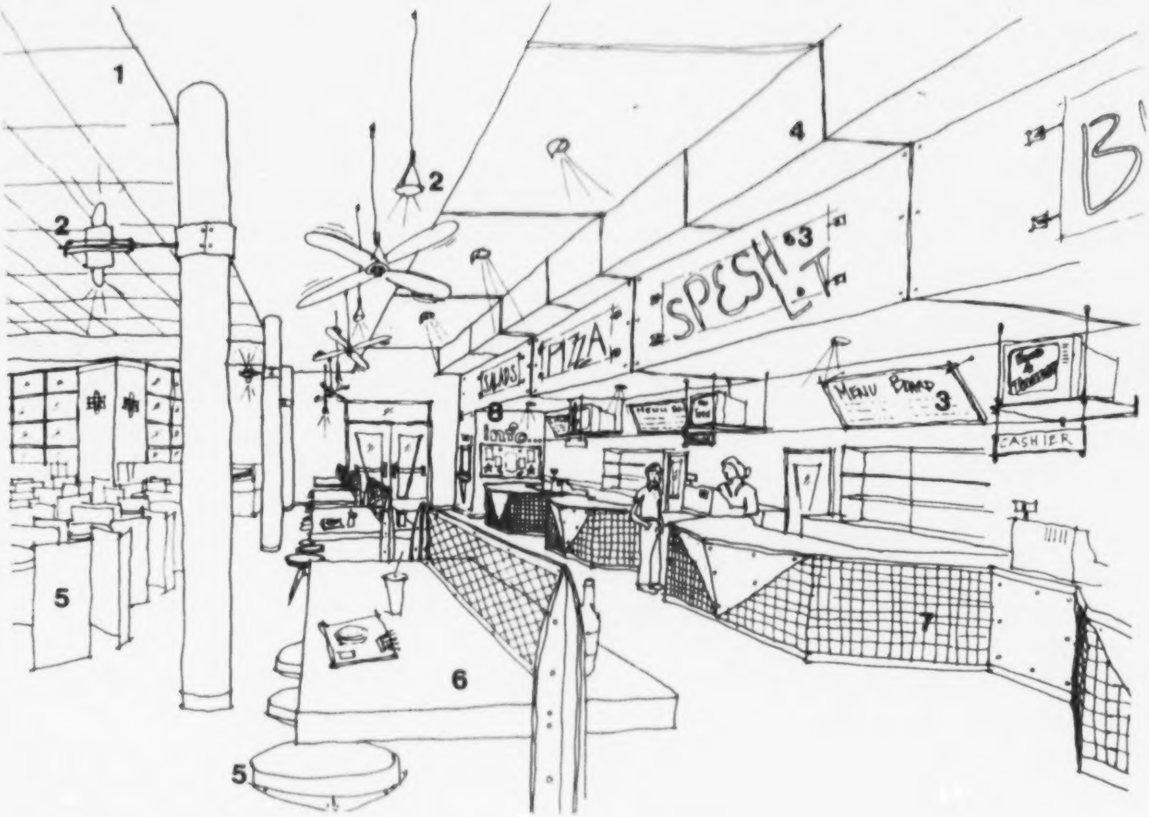
4. Acoustic Wall Panels: Locate these on available wall surfaces. They add color and texture and minimize institutional characteristics of the space.

5. Seating Variety: Provide a variety of table shapes and sizes. In addition to free standing tables, consider fixed or movable booth seating along circulation/edge areas of high school dining spaces.

6. Condiment/Dining Counter: This provides a physical barrier between serving areas and seating areas.

7. Finishes: A variety of colors and durable textures should be incorporated to enhance visual interest of the space and to reduce institutional qualities of the space. Durable, economical materials which lend themselves to pattern making (ceramic tile, V.C.T., glazed C.M.U., glassblock, etc.) are excellent finishes.

8. Nutrition Information: Displays should be located throughout the dining space. Nutrition information can be conveyed by a variety of media, also. Tackboards for bulletins and artwork displays can be incorporated into the design. Video monitors can be located as needed to provide students with ever changing menu and pricing information, as well as nutritional information above and beyond that which is displayed on the products' packaging.


1
2
2
4
B
SALADS
PIZZA
SPESH
L.T.
3
MENU BOARD
3
8
CASHIER
5
6
7
5

VIEW ALONG SERVING AREA AT FOOD COURT HIGH SCHOOL

D. Kitchen Types and Food Preparation Processes

Kitchen Types:

A ***base kitchen*** is located on-site and prepares meals for on-site consumption and for delivery to satellite schools. The major difference between a base kitchen and a regular on-site kitchen is that a larger volume of meals is prepared at a base kitchen for off-site delivery. As such, additional equipment and loading area is needed for transport of meals from the base kitchen preparation site to the satellite schools and their kitchens.

Although the preparation equipment in a base or central kitchen is similar to that found in an on-site kitchen, the layout and space requirements necessary for storage, handling, and staging of the food transport carriers are vastly different. Additional electrical outlets are needed to preheat, prechill, and maintain the temperature of the carriers prior to food transport.

An on-site kitchen prepares meals for on-site consumption. It requires area for on-site preparation equipment and receipt of standard size food product deliveries.

A satellite kitchen receives meals that have been prepared off-site at a base kitchen. It requires a receiving area large enough to accommodate the anticipated delivery vehicles. It requires enough floor area for ample reheating equipment.

When considering a satellite system, extreme care should be exercised to prevent food contamination. A carefully drawn and executed HACCP (Hazard Analysis and Critical Control Points) system plan will provide the safeguards necessary.

In a hot and cold bulk satellite system, the foods are normally prepared the morning of service. The food generally is cooked, transported, and served in the same pans. Once the food is cooked, it is placed in a preheated holding cabinet for transport. Cold food is prepared and transported in a refrigerated transport cabinet.

In a chilled delivery satellite system, the food is cooked and quickly chilled to a refrigerated state. The food then is placed in containers for transport to the satellite schools in refrigerated trucks or containers.

If the food containers are returned in a soiled condition, space must be allocated for holding, cleaning, and sanitizing the containers.

Food Preparation Processes

Cook / Chill is a process that has been used for about 20 years in the United States. It functions on the principle of cooking food to a "just done" state, followed by rapid cooling and storing. Cook/Chill prepares food for future consumption and enables the operator to make food for more than one meal at a time. It is intended for very large school districts with the capability of delivering food from a central Cook / Chill operation to numerous satellite locations.

There are two methods used for preparing the food. The first method is for liquid foods such as sauces, stews and soups. These are cooked in a steam jacketed kettle, packed in Cryovac bags, and rapidly chilled. The second method is for solid foods. Foods such as whole meat are packed in Cryovac casings and cooked in a hot water bath. When the cooking is completed, the water is chilled to cool the food. The Cook / Chill tank can be programmed to cook and chill food at night while no attendants are present.

There are two methods used for chilling the food, high velocity air blast chilling and water bath chilling. Foods prepared for and chilled by high velocity air blast have a shelf life of five days. Whereas foods prepared for and chilled by water bath, have a shelf life of between a 21 day period and 45 day period, depending on the food product. This means that if a school district were to serve spaghetti sauce two times in a 21 day period, they would only need to prepare it once.

Cook / Chill requires six basic pieces of equipment to prepare and chill food prior to extended storage life:

- ***steam jacketed mixer*** kettles in various sizes with programmable controls
- ***metered filling station*** to package pumpable product from the mixer kettle into Cryovac casings
- ***Cook / Chill tank*** for water bath cooking and rapid chilling of solid meats or mixture items that are vacuum sealed in Cryovac casings
- ***tumble chiller*** to rapidly reduce the temperature of filled Cryovac casings pumped from the Cook / Chill mixer kettles
- ***ice builder*** to efficiently supply ice cold water to the tumble chiller and the Cook / Chill tank
- ***blast chilling equipment*** to provide chilling for short term storage of products not compatible with water bath methods

Coordinate kitchen types and food preparation processes with the school food service program manager.

CHAPTER V: EQUIPMENT

A. Equipment Selection

The amount, size, and type of equipment may directly affect the volume and the financial success of a school food service operation. Inadequate or unsuitable equipment can limit production or require additional staff to operate. Too much equipment requires more time to clean and reduces the efficiency of the kitchen. Each piece of equipment typically used in schools is discussed in this section.

Another critical factor in equipment selection is equipment quality and initial cost. High quality kitchen equipment is finely crafted, made of the most durable materials, and is designed for a longer than average life span. Investing in high quality equipment is a good idea when the school system can afford the initial investment. However, as equipment budgets may not always provide for this, a strategy for equipment quality selection should be established. Determine with the food service manager those pieces of equipment which are most critical to the food service program in operation.

- ***Invest in high quality equipment for critical program items.***
- ***Consider initial investment costs and equipment durability, life span, and life cycle operating costs.***
- ***Consider investment start-up costs and depreciation versus opportunities for future upgrade of equipment.***
- ***Consider energy saving features.***

B. Sizing Equipment and Food Batches

The following describes the method for computing the equipment needs using the critical recipe method. Calculate the adequacy of equipment capacity by determining the number of portions needed in relation to the equipment capacity and time constraints.

Steps used for this method:

- *Select several menus that represent typical food to be prepared and list the equipment to be used.*

- *Determine the number to be served and the portion size required.*

- *Multiply the number of portions by the portion size.*

- *Calculate the portions and, in weight or volume, serving demands for food, especially peak demand.*

- *Compile information on quantities and time required for processing the food item in the specific piece of equipment.*

- *Calculate the equipment's projected capacity per minute into the total quantity produced per batch and number of servings.*

- *Calculate the size and/or the number of pieces of equipment needed to produce the quantity of food per minute required to meet maximum demand.*

Other considerations:

- *Consider the ability of employees to handle and use equipment with ease and safety.*
- *Equipment must be sized for food service program participation or enrollment. If the school wants to increase participation, sizing based on enrollment is strongly recommended.*
- *Certain foods lose quality soon after they are prepared and batch times should be planned to ensure that quality is retained.*
- *Often, the quality of the product is affected by the quantity prepared. Therefore, the quantity prepared should be limited to an amount that will yield the highest possible quality product.*

C. Receiving Equipment

The types, volume, and frequency of materials handled determine the planning of receiving and storage areas. A study of the flow of materials from the receiving and storage areas to the various work areas should be made, shortening the distances and minimizing handling where possible. As a general rule, locate the storage areas closer to the work areas of the kitchen than to the receiving area. Goods are received less often than they are issued. The use of good materials handling equipment can facilitate the movement of items received and issued.

Hand and Platform Trucks : When goods are being unloaded in the receiving area, provide a means of transportation to transfer goods to storage and preparation areas. A two-wheel hand truck or a four-wheel platform truck can be used.

Two-Wheel Hand Truck

- Recommended frame size is 48" high and at least 14" wide with bottom angle nose at least 14 x 7 inches.
- Wheels with rubber tires.
- Advantages: Low initial cost and can be used in narrow spaces
- Disadvantages: Can handle only a limited amount of weight and bulk.

Four-Wheel Platform Truck

- Metal Frame
- Rubber Bumpers
- Platform may be metal, wood or plastic or rubber composition.
- Advantage: can handle three to four times the weight and bulk of a two-wheel hand truck.
- Disadvantage: cannot fit through small aisles.

D. Storage Equipment

School food service storage requirements are constantly changing and the state in which products are purchased changes frequently. Many schools that were built more than 20 years ago have more than adequate refrigerator space but are short on freezer space. Schools that have converted from permanent ware to disposable ware find that they do not have sufficient dry storage for the disposable plates and flatware. Schools that have changed the frequency of receipt of goods can have too much or too little storage. Exercise care when determining the size of the storage to account for the specific purchasing practices of the school.

Dry Storage: The dry storage area provides orderly storage of food not requiring refrigeration. It also provides protection of foods and other supplies from spoilage, theft, fire, and insects. Good ventilation is necessary to retard the growth of various types of bacteria and molds. Maintain temperatures between 50 and 70 degrees F. Thermometers that are easy to read should be available on a wall near the door at the average eye level. The storeroom should be free of uninsulated steam and water lines, and unsheathed sewage lines. Ideally, no water, steam or sewer lines should be located in the storage areas. This is to prevent contamination, flooding, and excessive heat from steam and hot water lines.

Space requirements in the dry storage area depend on the menu type, number of meals served, food quantities purchased, frequency of food deliveries, and the degree of use of disposables. To estimate storage requirements, allow approximately one-half square foot of space for each meal served. Where disposables are used extensively, allow 50% more area for the disposables. Aisles within storage areas should be at least 42" wide for access to shelving.

Storage Construction Features:

- Floors should be level with food preparation areas and receiving areas to allow the use of hand trucks.
- Exterior walls, interior walls, and subfloors need to be tightly constructed and vapor sealed below ground, if located on a slab. The storeroom should be rodent and insect proofed by eliminating holes or openings where rodents and insects can harbor. The walls and roof should be insulated to ensure protection from the cold. Walls and ceilings should be light colors, smooth, and easy to wash, maintain, and repair.
- The door should be heavy duty with a minimum width of 42" and self closing.

Storeroom Equipment: Shelves should be sturdy metal or plastic, able to support loads without sagging or collapsing. Consult manufacturer's literature for load capabilities of particular shelving system employed.

Containers: Containers used to store dry items such as flour, sugar, dry beans etc. must be approved for food use and have tight-fitting lids.

Fire Extinguishers: Power or hand operated fire extinguishers should be available for emergencies.

Walk-in Refrigeration: Includes both freezers and refrigerators. Locate freezers and refrigerators close to receiving and preparation areas. Walk-in refrigeration should be prefabricated panels, with insulated tiles floors, specifically designed for refrigeration.

- ***Refrigerator space is based on a 15-day supply of food to account for storage of USDA Donated Commodities, in addition to purchased food and left overs.***
- ***Freezer space is based on a 30 day supply.***

Reach-in Refrigerators and Freezers

The number, size, and locations of reach-in refrigerators and freezers are dependent on the menu, preparation methods, serving systems and locations, and the proximity of the walk-in units. Reach-in or roll-in units should be located next to the serving line to preserve the cold food items in their freshest state possible and to prevent contamination.

Controlled thaw refrigerators may also be considered. The purpose of a controlled thaw refrigerator is to provide rapid thawing of frozen food by heating frozen food to 40 degrees F. Once the food stored in the controlled thaw refrigerator reaches 40 degrees, the equipment acts as a refrigerator. The controlled thaw will thaw food overnight as opposed to 2 ½ days in a normal refrigerator.

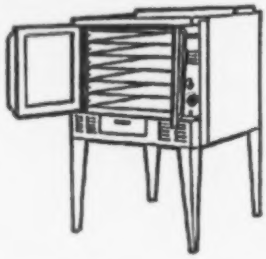
E. Preparation Equipment

Convection Oven: is very fast when cooking very shallow items such as cookies. This is because hot air is constantly flowing around the food. Convection oven capacity is dependent upon the types of food, the number of racks used, and the heat input.

REFRIGERATION AND FREEZER STORAGE

NUMBER OF MEALS	REFRIGERATOR		FREEZER	
	INTERIOR CUBIC FOOTAGE	EXTERIOR SQUARE FOOTAGE	INTERIOR CUBIC FOOTAGE	EXTERIOR SQUARE FOOTAGE
Under 250	202	48	404	54
251-400	324	48	648	86
401-600	485	64	970	130
601-800	647	87	1294	172
801-1,000	809	108	1618	216
1,001-1,250	1010	135	2020	270
1,251-1,500	1213	162	2426	324

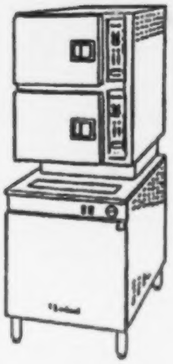
Convection ovens come in two standard models, a single deck convection oven and a double deck convection oven. Double deck convection ovens are preferred since they do not occupy the floor space that multiple single deck convection ovens do.



Convection Oven

Convection Steamer: reduces cooking time and decreases the loss of nutrients. Convection steamers operate at normal pressure and therefore preserve the flavor of the food. Steamers encourage the use of progressive cooking. Progressive cooking reduces the holding time, thus reducing nutrient loss caused by holding vegetables at high temperatures for long periods. In addition, progressive cooking reduces over production, thus lowering the cost of food.

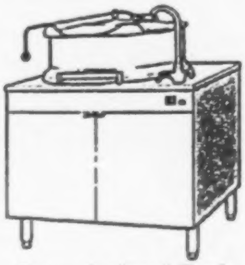
Convection steamers normally are available in single compartment and two compartment models, smaller ones holding three 12" x 20" x 2-1/2" pans per compartment and larger ones holding eight pans per compartment. Determination of the steamer capacity below is based on cooking fresh potatoes in a 12" x 20" x 2-1/2" pan (holding approximately nine lbs. per pan), total cooking time being 20 minutes.



Convection Steamer

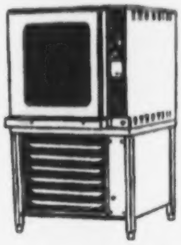
Steam Jacketed Kettle: is used to prepare such items as stews, soups and sauces. Use of the steam jacketed kettle decreases the cooking time due the fact that heat is applied completely around the food in the kettle, not just on the bottom. Sizing a kettle depends on the types of food to be prepared and the variety. If more than one item is to be prepared in the kettle for a meal, it may be preferable to have two smaller kettles, rather than one large one.

Manufacturers generally express kettle size as total kettle capacity (level full) and the usable capacity is approximately 20% less than stated. This is to allow for stirring and to prevent the kettle from boiling over.



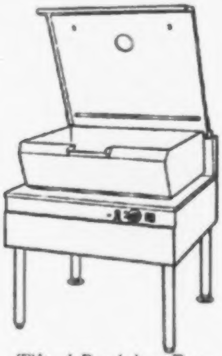
Steam Jacketed Kettle

Combi-Oven: is a relatively new piece of equipment that has found a place in the schools. "Combi-Ovens" can cook as convection ovens, convection steamers, or a combination of the two. The oven can reduce shrinkage when roasting and provide crusting for breads. It can serve as an extra oven or steamer when needed. It should be considered in lieu of a convection oven where more than one oven is required or where space does not permit both a steamer and a convection oven.



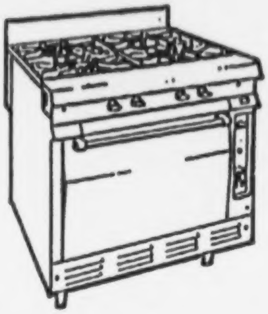
Combi-Oven

Tilting Braising Pan: is the most versatile piece of equipment in the kitchen. The tilting braising pan performs all the functions of a steam jacketed kettle. In addition, it can be used as a griddle, fryer, bain marie, steamer, and for thawing.



Tilted Braising Pan

Utility Range: useful for preparing small batches of food, sauces, etc. In all school kitchens, the utility range is not intended for cooking large quantities of food; these items are better prepared in the oven, steamers, kettles, and fryers. Where space permits, a four-burner range is recommended. If space is constrained, a two-burner range may be used for up to 400 students.



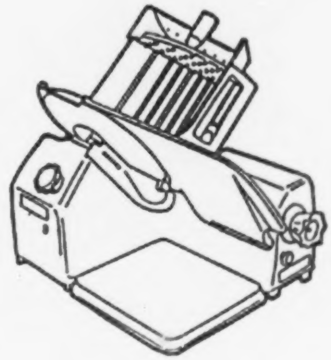
Utility Range

Food Mixer: selection depends on the amount of baking that a school does. Most schools in Maryland do only partial or limited baking, if any. Therefore the mixers are used for mixing a variety of convenience items, such as instant mashed potatoes. In these cases only, a small mixer is necessary.

In addition to mixing, special attachments can be purchased so that the mixer can be used for cutting, shredding and grinding. Floor mounted mixers should be purchased with bowl dollies so that the contents of the mixer can be moved easily.

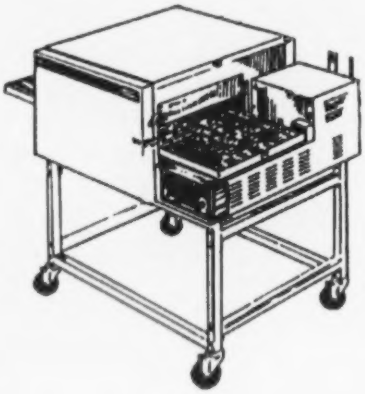
Food Mixer

Food Slicer: is an essential piece for a food service, even in the day of convenience food. A food slicer is needed for quantity slicing, such as meats and cheeses, tomatoes etc. Slicers are adjustable from wafer thin to 3/4 inch.



Food Slicer

Conveyor Pizza Oven: should be considered as an integral piece of equipment due to the popularity of pizza in schools. Although the oven can be used for other purposes, it is most effective in cooking pizza, whether frozen, made from frozen dough, frozen dough balls, or from scratch. Conveyor pizza ovens are available in several sizes, with varying widths for the conveyors. The ovens are available in a single, double, or triple stack, depending on the demands.



Conveyor Pizza Oven

Deep Fat Fryer (Optional): use should be limited in accordance with intended nutritional outcomes. While students should not eat fried foods every lunch, the consumption of fried items on a periodic basis can add welcome changes to the menu. Although some "fried" food can be prepared in the oven, such as French fries and "Maryland Fried" Chicken, the oven fried products cannot replace the flavor that is gained by deep fat frying.

Preparation Tables: of the correct types, size and quantity are essential for the operation of a food service. The exact number of tables depends on several factors: menu, number of work stations and employees, amount of mobile equipment used, layout of the kitchen, and the space available.

Tables are available with open fronts for under shelf storage of mobile storage bins or racks. Tables are also available with enclosed cabinets, overhead racks, back shelves, drawers, sinks and electrical outlets. If not equipped with electrical or plumbing, tables may be mobile for ease of cleaning.

The number and size of work tables depend upon the number of employees requiring table space for food preparation. To determine the approximate lineal footage of work tables, multiply the number of employees requiring table space by four lineal feet per employee. Then subtract the length of the baker's table, if needed. Generally, tables should not be less than 6 feet long and require 8 feet for two employees to work at. The exact length of the tables may depend on the space available and may need to be fabricated to fit the space.

F. Mobile Equipment

Mobile equipment can assist school food service operations in being more efficient. Mobile equipment can be used for transporting and storing food and equipment. It can also be the resident location for equipment so that it can be moved and used in the locations most needed. Install casters on pieces of preparation and cooking equipment to facilitate cleaning.

Mobile equipment must match the equipment with which it is used. For example, racks for roll-in refrigerators must match the manufacturer and model of the refrigeration to provide the most usable space while fitting in the roll-in. The following is a list of types of mobile equipment found in schools. Every item is not required in all kitchens.

Cooling racks - aluminum, plastic, or stainless steel. Accommodate both food service and sheet pans.

Flatware and tray cart - stainless steel, aluminum, or plastic frame; shelf at top to hold plastic cylinders for flatware; shelves may be plastic, fiberglass or stainless steel.

Food holding cabinets - (hot, cold, or proofing), aluminum or stainless steel. Cabinets may be insulated or uninsulated, heated or unheated. Cold food cabinets may be plastic. Cold food cabinets may require cooling plates (filled with harmless sealed-in chemical refrigerant). Hot food cabinets may be used as a proofing cabinet by inserting a removable heater/humidity unit.

Garbage can dollies - steel frame or plastic. (needed if garbage cans are used)

Mixer bowl dolly - with 30 qt. mixers or larger.

Mixer stand - for 20 qt. mixers, stainless steel, with locking wheels and rack for attachments.

Plate cart - may be self leveling or not. Stainless steel, tubular, aluminum frame with stainless steel, wire, plastic, aluminum or wire shelves or body. If equipped with self leveling devices, they should be adjustable.

Pot rack - aluminum; stainless, chrome plated, or anodized steel; or plastic frame, five to six feet high, 18 to 27 inches wide, three to five slotted or wire shelves with locking wheels.

Refrigerator storage racks - aluminum; stainless, chrome plated, or anodized steel; or plastic frame, three to five slotted or wire shelves with locking wheels, 18 inches wide with lengths to fit needs.

Slicer cart - aluminum, stainless, or tube frame; with or without pan rack below, locking wheels.

Soak tanks for flatware - stainless steel or plastic; designed to hold one combination dish rack; should have closed drain and locking wheels.

Storage bins - stainless or plastic; should fit under baker's table.

Tray carts - stainless, plastic or tube frame; with stainless, fiberglass, wire, or plastic shelves to hold trays.

Utility carts - stainless steel, tube, plastic or aluminum frame, stainless steel, fiberglass or plastic shelves, 2 or 3 shelves.

G. Serving Line Equipment

Although the function of the equipment is the same, the choice of serving equipment depends largely on the ages of the students and varies with school type. The serving line or configuration will consist of tray and flatware pickup, hot food, cold food, ambient food, milk cabinet, ice cream cabinet, and cashiering.

Elementary Serving Line Equipment

Elementary School serving lines are simple and usually straight. The equipment should be mobile with locking casters that can be joined. The equipment is available in a variety of color fronts. Include the following:

- ***Hot food section:*** Length should be five feet long, containing four wells. Wells should be able to accommodate 12" x 20" hot food service pans to a depth of six inches. Hot food section should have a protector case. In schools where considerable pizza is served using 18" x 26" sheet pans for baking, consider including a heated top counter with protector case and overheat heat lamp. This will provide space to serve the pizzas directly from the sheet pan without taking up hot food space and avoiding double handling. Equip the hot food section with tray slide.

- ***Cold food section:*** Length should be four to five feet. The cold food section should be equipped with mechanically refrigerated cold pan. Cold food section should have a protector case. Equip the cold food section with tray slide. Use refrigerated display cabinets with sliding glass doors to increase the capacity for cold food without increasing the space required.

- ***Ambient food section:*** Consists of a solid top section for counter top merchandising of foods that require no heat or refrigeration. Length of this section should be three to four feet and should include electrical outlets to plug in food merchandisers, such as a pretzel cabinet. Equip the solid top section with a tray slide.

- ***Milk cabinet*:** Should be mobile, designed to hold a sufficient number of milk cartons to serve the entire meal period on that line.

- ***Ice cream cabinet:*** Two section, self-leveling cabinet, designed for novelties with locking tops.

- ***Flatware and napkin pick-up:*** May be provided as part of the cashier stand or may be a separate section.

- ***Cashier stand:*** Single stand with access to power and connection to food service's computerized bookkeeping system at the point of sale location. The cashier stand should be equipped with a foot rest, stool, and tray slide, ADA accessible.

- ***Signage:*** Include lighted menu boards and station identification signs that are easily visible to the customer.

Middle School Serving Line Equipment

Middle School serving lines add some complexity to the simple elementary school's serving line. The equipment should be modular, but not mobile, that can be joined together in an interlocking fashion. The equipment is available in a variety of color fronts. The following should be included in each serving line:

- ***Hot food section:*** Length should be five to six feet long, containing four or five wells. Wells should be able to accommodate 12" x 20" hot food service pans to a depth of six inches. Hot food section should have a protector case. In schools where considerable pizza is served using 18" x 26" sheet pans for baking, consideration may be given to including a heated top counter with protector case and overheat heat lamp. This will provide space to serve the pizzas directly from the sheet pan without taking up hot food space and avoiding double handling. Hot food section should be equipped with tray slide.

- ***Cold food section:*** Length should be four to five feet. The cold food section should be equipped with mechanically refrigerated cold pan. Cold food section should have a protector case, permitting self service. Cold food section should be equipped with tray slide. Refrigerated display cabinets with sliding glass doors may be used to increase the capacity for cold food without increasing the space required.

- ***Ambient food section:*** Consists of a solid top section for counter top merchandising of foods that require not heat or refrigeration. The length of this section should be four to five feet and should include electrical outlets to plug in food merchandisers, such as a pretzel cabinet. The solid top section should be equipped with a tray slide.

- ***Milk cabinet:*** Should be mobile, designed to hold a sufficient number of milk cartons to service the entire meal period on that line.
- ***Ice cream cabinet:*** Two section, self-leveling cabinet designed for novelties with locking tops.
- ***Flatware and napkin pick-up:*** May be provided as part of the cashier stand or may be a separate section.
- ***Cashier stand:*** Single stand with access to power and connection to food service's computerized bookkeeping system at the point of sale location. The cashier stand should be equipped with a foot rest, stool, and tray slide, ADA accessible.
- ***Signage*:** Include lighted menu boards and station identification signs that are easily visible to the customer.

High School Serving Line Equipment

High School serving should take advantage of the students' ability to serve themselves as much as possible. The serving equipment should be modular, unless special conditions, such as food courts, require custom fabricated equipment. Equipment should not be mobile but can be joined together in an interlocking fashion, if the configuration dictates. Standard equipment is available in a variety of color fronts. The following should be included in each serving section line:

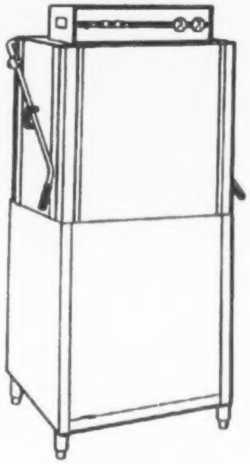
- ***Hot food section:*** Length should be six feet long, containing five wells. Wells should be able to accommodate 12" x 20" hot food service pans to a depth of six inches. Hot food section should have a protector case. In schools where considerable pizza is served using 18" x 26" sheet pans for baking, consideration may be given to including a heated top counter with protector case and overheat heat lamp. This will provide space to serve the pizzas directly from the sheet pan without taking up hot food space and avoiding double handling. Hot food section should be equipped with tray slide.
- ***Cold food section:*** Length of section should be at least five feet long. The cold food section should be equipped with mechanically refrigerated cold pan. Cold food section should have a protector case, permitting self service. Cold food section should be equipped with tray slide.
- ***Ambient food section:*** Consists of a solid top section for counter top merchandising of foods that require not heat or refrigeration. The length of this section should be at least five feet and should include electrical outlets to plug in food merchandisers, such as a pretzel

cabinet. The solid top section should be equipped with a tray slide.

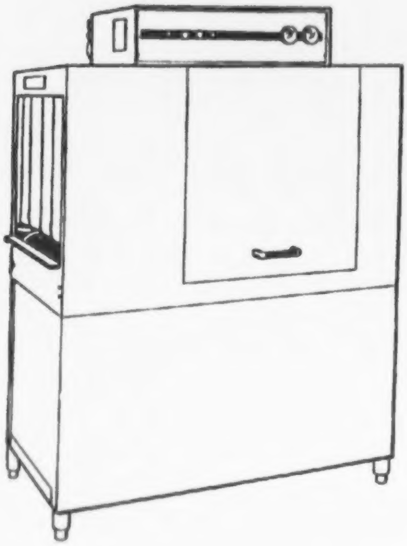
- ***Milk cabinet:*** Should be mobile, designed to hold a sufficient number of milk cartons to serve the entire meal period on that line.
- ***Ice cream cabinet:*** Three section, self-leveling cabinet designed for novelties with locking tops.
- ***Flatware and napkin pick-up:*** This may be provided as part of the cashier stand or may be a separate section.
- ***Cashier stand:*** Should be provided for each entree section contained in a straight line, scatter or food court outlet. The cashier stand may be single or double sided with access to power and connection to food service's computerized bookkeeping system at the point of sale location. The cashier stand should be equipped with a foot rest, stool, and tray slide or slides, ADA accessible.
- ***Signage:*** Include lighted menu boards and station identification signs that are easily visible to the customer.

H. Sanitation Equipment

Dishwasher: dishwashing needs of the food service program should be identified early on and should reflect minimal life cycle costs. Process includes the scraping, presoaking, washing, sanitizing, and drying of dishes, flatware and trays. Three factors affect the size of the dishwasher: the types of dishware to be washed, the number of items per meal, and the speed at which the dishes are returned. In an elementary school with students using compartment trays, there is usually only one item to wash, the compartment tray. In high schools, there may be several dishes but most of them will be disposables with a permanent tray.



Dishwasher



Dishwasher

Sinks: Compartment sinks are needed for pot washing and food preparation. Health Department codes require that a separate three compartment sink be used for pot washing. Two compartment sinks are normally used for food cleaning and preparation. Hand sinks are used for hand washing and require soap and towels at the sink, and also a trash receptacle.

Garbage Disposal: provide a garbage disposal machine in the production area and the dishwashing area. The number and types needed depends on the amount of waste generated and the local environmental requirements and concerns.

A pulper can be used in place of a disposal. Pulper systems grind the food and other waste, using recycled water to wash the water the waste through the system. The water is then extracted from the pulped waste and the waste is deposited into a container. The ground product contains organic waste and paper, which can be placed in landfill or used in composting. Consult with the manufacturer of the specific waste pulping system used to determine area requirements.

I. Ventilation Equipment

A ventilating system is required when the production of food produces heat, odor, smoke, steam or grease-laden vapors. The equipment normally vented includes ovens, ranges, fryers, steam-jacketed kettles, steamers, combi-ovens, tilting braising pans, and deep-fat fryers. This system should be designed by a mechanical engineer in conjunction with a food service consultant.

A ventilating system consists of a ventilator (sometimes referred to as a hood), ducts, air-movement equipment, and other special accessories as required. The system parts consist of the following:

Ventilator: should be of the capacity and configuration so as to prevent cooking vapors from cooking equipment from entering the surrounding kitchen area.

Ducts: the means by which air from the ventilator is carried outside the food preparation area.

Exhaust Air Movement Equipment: consists of fans, motors etc. that are used to exhaust air from the cooking area through the ventilators and ducts to the outside. The exhaust air movement equipment is usually located on the roof above the ventilator.

Make-Up Air Movement Equipment: consists of a ventilation system ducting and distributing air. Fans and motors are used to induce air from the outside to the ventilator area. Make-up air amount requirements vary from 50% to 80% of the exhaust requirements.

Fire Protection Equipment: consists of ways and means of automatically or manually turning off the ventilator and cooking equipment, closing off the duct openings of the ventilator, and extinguishing the fire.

Performance Data: The amount of ventilation depends on the pieces of equipment that are served by the ventilator, and are referred to by three categories: light duty, medium duty, and heavy duty. The following chart shows the three categories, examples of the pieces of equipment that require each category, and the cubic feet per minute (CFM) per lineal foot (LF) of exhaust required.

Types of Ventilators: Ventilators are generally operated by either filtering the grease and suspended particles or employing the principle of centrifugal force.

Baffle Type Filter: The most common method of filtering employs a removable metal baffle filter. Grease laden air is drawn into the filter by the exhaust fans. As the air starts through the aerodynamic baffle system, it undergoes a series of compressions, expansions, and pressure changes. The heavy grease is deposited safely and quickly on the baffles while the grease-free air passes through the filter and up the exhaust duct. The baffle's smooth surface enables the collected grease to run off into collection troughs without dripping on food, utensils, or burner surfaces.

High Velocity Grease Extractor: In this method, grease and other suspended particles are removed by centrifugal force. The centrifugal force is accomplished by forcing

EXHAUST REQUIREMENTS

CATEGORY	EQUIPMENT	EXHAUST NEEDED
LIGHT DUTY	Steamers, Kettles, Convection Ovens	250 CFM/LF
MEDIUM DUTY	Ranges, Tilting Braising Pans	300 CFM/LF
HEAVY DUTY	Fryers	350 CFM/LF

high velocity air to make rapid turns within the unit. Depending upon the design, water or cool air may be employed to increase the efficiency of the unit. High velocity grease extractors are generally self-cleaning. Across section of such a unit is shown below:

Ventilators: Come in two basic styles, canopy and non canopy. They may be either metal baffle or high velocity type.

Canopy: This style ventilator normally overhangs a minimum of 12 inches beyond the edge of the battery of cooking equipment on all exposed sides. The distance from the floor to the lower edge of the ventilator should not exceed seven feet or be less than six feet three inches.

Low Proximity: This style of ventilator does not overhang the equipment. Instead, the front edge of the ventilator is set back from the front of the cooking equipment. This style ventilator is frequently referred to as a *backshelf* style.

Ventilator Features:

- *Light fixtures, globe type incandescent, or recessed incandescent or fluorescent*
- *Eighteen gauge stainless steel construction with liquid tight welds*
- *Front or internal discharge, tempered make-up air*

J. SUMMARY OF REQUIRED EQUIPMENT

The following is a summary of the equipment for various student populations. This is intended to be a reference only; the specific needs of each kitchen are different.

	STUDENT POPULATION						
EQUIPMENT REQUIRED	Under 250	251 - 400	401 - 600	601 - 800	801 - 1,001	1,001 - 1,250	1,251 - 1,500
RECEIVING AREAS							
2 - wheel Hand Truck	1	1	1	1	1	1	1
4 - wheel Platform		1	1	1	1	1	1
PREPARATION AREAS							
Convection Oven							
Single Deck	1						
Double Deck		1	1	2	2	2	3
Convection Steamer							
3 Pans per Compartment	1	1					1
8 Pans per Compartment		1	1	1	1	2	2
Combi-oven							
11 Sheet Pan Capacity				1	1	1	1
Steam Jacketed Kettle							
20 Gallon Kettle	1	2	1				
30 Gallon Kettle		or 1	and 1 or 2	1			
40 Gallon Kettle				and 1 or 2	2	1	
60 Gallon Kettle						and 1	2
Tilting Braising Pan							
20 - 25 Gallons		1					
30 - 35 Gallons		1	1	1	1	1	1
Utility Range							
18" Wide Range	1	1					1
36" Wide Range with Oven	or 1	or 1	1	1	1	1	1

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EQUIPMENT REQUIRED

	STUDENT POPULATION						
	Under 250	251 - 400	401 - 600	601 - 800	801 - 1,001	1,001 - 1,250	1,251 - 1,500
Mixer							
Limited Baking							
20 quart with attachments	1	1					1
30 quart with attachments			1	1	1		
60 quart with attachments						1	1
Baking							
20 quart with attachments	1	1					
30 quart with attachments		1		1	1	1	1
60 quart with attachments			1	1			
60 quart / no attachments					1	1	1
Slicer							
Electric Manual	1	1					1
Electric Automatic			1	1	1	1	1
CLEANUP							
Dishwashing Requirements							
Single Tank	1						
Single Tank Conveyor		1	1	1	1	1	1
Compartment and Hand Sinks							
Two Compartment Sink	1	1	1	1	1	1-2	1-2
Three Compartment Sink	1	1	1	1	1	1	1
Hand Sink	As Needed						
Dishwashing Area	1	1	1	1	1	1	1
Vegtable Prep					1	1	1
Food/Waste Pulper	As Required by School System						

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CHAPTER VI - FACILITIES DESIGN

A. General Design Considerations

1. Accessibility for Persons with Disabilities

Public schools must provide access for students with disabilities to all educational programs in the least restrictive manner. They also may not discriminate against individuals with disabilities in matters of employment and public services. Consequently, education facilities must be fully accessible to students, teachers, and public users. *Title II* of the *Americans With Disabilities Act (ADA)* requires public schools to comply with either the *Uniform Federal Accessibility Standard (UFAS)* or the *ADA Accessibility Guideline (ADAAG)*. In addition to the federal standard, the *Maryland Accessibility Code (COMAR) .05.02.02* also applies.

Spaces used primarily by children in elementary schools should comply with the *Recommendations for Accessibility Standards for Children's Environments*, U.S. Architectural and Transportation Barriers Compliance Board (ATBCB), 1992, or the *Recommendations for Accessibility to Serve Physically Handicapped Children in Elementary Schools*, U.S. Department of Education, 1986, which modify and add to the *Uniform Federal Accessibility Standards* (UFAS)

Sections critical to food service program space designs include:

- 4.1 Minimum Requirements
- 4.2. Space Allowance and Reach Ranges
- 4.3. Accessible Route
- 4.4. Ground and Floor Surfaces
- 4.13. Doors
- 4.24. Sinks
- 4.25. Storage
- 4.27. Control and Operating Mechanisms
- 4.28. Alarms
- 4.30. Signage
- 4.31. Telephones
- 4.32 Fixed or Built-in Seating and Tables
- 4.33 Assembly Areas
- 5.0 Restaurants and Cafeterias

The distance between fixed equipment must meet circulation and access space requirements. Moveable equipment can be effectively used and easily shifted to meet individual needs. Standard furniture and equipment can often be specified to meet the standards set forth by ADAAG/UFAS. Adjustable seat, table and display surface heights are desirable. Handrails or handgrips may be of assistance to some individuals at work surfaces or when using power equipment. Custom made garments or aprons for individuals with adaptive or assistive devices should be considered.

2. Energy Conservation

Energy conservation is an important design goal in every project for environmental and financial reasons. The education facilities design process should include an energy and life cycle cost analysis correlated with the scope of the project. The following items should be analyzed:

- ***Site orientation, wind screens, and other natural factors***
- ***Building envelope and spatial volumes***
- ***Fenestration, shading devices and use of natural daylight***
- ***Thermal characteristics of materials***
- ***Initial costs of materials and systems***
- ***Maintenance requirements***
- ***Operating expenses based on occupancy, use, and fuel sources***
- ***Types of illumination and power***
- ***Types of heating, ventilating and air conditioning systems including special exhaust and ventilation systems***

The professional design reference commonly used is ASHRAE/IES Standard 90.1-1989 *Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings.*

3. Building Ecology

All acts of building have impacts on the natural environment. Building ecology attempts to minimize the negative impacts of the construction and inhabitation of a building through design and material selection.

Information about the environmental impacts of design decisions is increasingly available. Presently, many facility designers already consider factors such as:

- human health effects associated with specific materials and systems
- indoor air quality
- energy consumption
- regulated environmental issues, such as chlorofluorocarbons (CFCs) and underground storage tanks

Building ecology incorporates these issues within a broad framework. Materials or systems are analyzed from "cradle to grave," studied for their environmental implications from raw material origins through manufacture; packaging, transportation, installation, maintenance, and ultimate demolition and disposal. Appropriate questions to be answered include:

- How much energy is used to bring a product to its point of use?
- Is the material derived from a sustainable or renewable resource?
- In addition to those factors considered at a product's point of use, are there environmental costs arising from other phases, such as manufacture, transportation, or disposal which should be considered? Are the materials recyclable?
- Are there aspects beyond indoor air quality which affect the compatibility of this product with its occupants?
- Do Material Safety Data Sheets indicate any environmental concerns?

When describing general design criteria in the educational specifications, incorporate statements encouraging the architect to consider global environmental impacts in selecting materials. Refer to the MSDE technical bulletin *Building Ecology and School Design.*

4. Indoor Air Quality

Indoor air problems can be discussed under two categories: thermal environment and air contaminants. The thermal environment involves several variables that cause relative degrees of human comfort or discomfort. These include air temperature, radiant temperature of surrounding surfaces, uniformity of air temperature, humidity, and air movement. Adverse thermal conditions can stress students or staff and, in turn affect the quality of the learning situation.

ASHRAE Standard 55-1992, *Thermal Environmental Conditions for Human Occupancy*, defines comfort temperature and relative humidity conditions for both summer and winter. A year round range of between 72 and 76 F degrees is generally acceptable assuming fairly uniform conditions throughout a room, with air motion in occupied locations within the space not above 30 feet per minute.

Maintaining the relative humidity between 30 and 60% is basically a health consideration. Above that range fungi and bacteria have been shown to produce rapidly. Above 70% RH, fungi growth can become a health risk. Conversely, respiratory irritation and aggravation of cold symptoms are a consequence of low humidity during cold weather.

The concentration of contaminants within the dining room are the result of emission rates from internal sources and the rate of dilution through the supply of relatively contaminant-free air. Air contaminants consist of numerous particulates, fibers, mists, fumes, bioaerosols, and gases or vapors that can impair human performance as well as present a full range of implications from mild irritation of the upper respiratory system to a serious health threat.

Because the dining area has a high concentration of people, one producer of contaminants is the occupants themselves. Humans generate odors and through sneezing, coughing, and talking disperse microorganisms into the air. Also, building maintenance and operations, building materials, and instructional materials can emit volatile chemical vapors into the air. Finally, food service functions produce numerous unwanted odors and contaminants into the air.

Filters with an ASHRAE Dust Spot Efficiency (not Arrestance) of 25% or more can provide superior protection of HVAC components exposed to the air compared to the coarse fiber or metal filters typically furnished with manufactured equipment. Better filtration, more thoroughly discussed in MSDE technical bulletin, *Air Cleaning Devices for HVAC Supply Systems in Schools*, can effectively remove airborne microorganism laden particulates, pollen and dust from the recirculated and outdoor air streams. Dust Spot efficiency in the range of 45 to 60% is preferred ; however should equipment constraints preclude filters in this range, a minimum of 25% can almost always be applied. Stainless steel exhaust hoods and ducts are required for most kitchens.

The introduction of adequate outdoor air is recognized as an important HVAC system consideration. An outdoor air ventilation rate is prescribed by ASHRAE Standard 62-1989, *Ventilation for Acceptable Indoor Air Quality*. Other professional references include Guidelines of the American Conference of Government Industrial Hygienists (ACGIH). For food service facilities, also refer to MSDE technical bulletins: *Carpet and Indoor Air Quality in Schools, Interior Painting and Indoor Air Quality in Schools, Selecting HVAC Systems for Schools, Maintaining Acceptable IAQ During the Renovation of a School* and *The Maintenance of Heating, Ventilating and Air Conditioning Systems and Indoor Air Quality in Schools.*

5. Building Automation Systems

Energy monitoring and control systems are frequently included in school design. These allow technicians to regulate one or more buildings from a central location. The food service program facilities will be linked to the central system. After-hours use may be scheduled into the control system or manual overrides may be used when necessary.

6. Fire Suppression and Supervisory Systems

Public safety is an integral part of school design. Building and life safety codes address construction, protection, egress, and occupancy features necessary to minimize danger. Local government agency reviewers are knowledgeable about the requirements. Fire suppression systems (sprinklers) are recommended, if not required, in food service programs. Provisions for the storage of flammable materials are also required.

7. Alarm and Detection Systems

Electronic security systems are frequently included in school design to guard against unauthorized access and theft. The food service program area must be included in the school's building-wide security plan. Alarm systems must meet ADAAG specifications for persons with vision and/or hearing disabilities.

8. Electronic Communications

Continuing developments in electronic communications affect many aspects of educational facilities design. Electronic communications systems via multi-media computers and video display terminals provide nutrition and other information from the world outside and from within the facility. The facility should be designed to maximize the potential of this emerging technology.

Provide enough outgoing lines and telephones to serve all staff members and offices with a minimum of disruption and delay. Provide enough incoming lines to meet administrative needs. Consider a direct-dial system. Provide adequate telephone lines for the remote transmission of hard copy, such as from fax machines. Provide hearing aid compatible and volume control telephones and text telephones to meet ADAAG requirements.

Build for the future. Even if extensive electronic equipment is not in the current equipment budget, design for its future integration. Do not design in isolation. Work with the school and school system to master plan for technology. Provide sufficient capacity in the system to allow for such developing technologies as voice mail and access to computer bulletin boards and databases. Provide a public address system that can be heard in all necessary locations with originating capabilities in appropriate locations. Consider both hard-wired and laptop technology. Provide ample work surfaces adjacent to computers to allow for comfortable use.

B. Site Design Considerations

1. Solar Orientation

In planning new facilities, designers have the opportunity to maximize daylight through the use of orientation, configuration, and architectural controls. Daylight may be used for visual tasks which require ambient lighting, supplemented with electric lights. Daylight is psychologically desirable and biologically beneficial. It provides a contact with the outdoors which people find satisfying. Education and dining facilities should provide as much daylight as possible. Of concern is the location of the sun relative to the building fenestration. North facades may provide soft, diffuse light without sun controls, but need glare control. East and West facades require louvers to avoid bright early and late direct sun. South facades offer the best opportunities for daylighting and can be designed to admit sun in the winter and block it in the summer.

2. Service Access

Food service programs require a dedicated delivery area separate from other school programs. Storage rooms need access to a delivery and receiving area suitable for large vehicles. Access may be provided through an overhead door at a dedicated food service loading dock or through double doors into a corridor immediately adjacent to the kitchen storage areas. The ability to move bulky materials and large pieces of equipment is important. A ground floor location should be provided. A large elevator in the school may be necessary if ground floor access is not available. Provide separate trash and can washing rooms immediately adjacent to the kitchen's trash exit. Waste product pathways going "out" should not mix with food products coming "in". Where pathway separation cannot be achieved, physical containment separation must be achieved.

Service driveways, parking, and turnarounds must be designed to accommodate the delivery vehicles anticipated, must not cross student pedestrian paths, must not block other traffic, must drain away from the building, and must be easy to plow for snow removal.

3. *Outdoor Areas*

Access to a protected outdoor dining area is desirable for food service programs. An open space with a paved surface, landscaping and site furniture, somewhat protected from wind, may be used for outdoor dining activities.

C. Regulatory Considerations for School Food and Nutrition Services

1. *General*

When building new or renovating an existing food service and nutrition program, the school must comply with the requirements of several regulatory agencies to ensure that the facility will meet or exceed health and safety requirements. The following must be considered.

2. *HACCP*

The HACCP (Hazard Analysis and Critical Control Points) system allows for the prediction of risk of contamination to food safety and prevention of contamination before it happens. Maryland has been the leading state in the implementation of HACCP. In 1993, the United States Public Health Service issued a new model health code for states and communities that incorporates the tenets of HACCP.

The HACCP process was developed in the 1960's as part of an effort of food manufacturers to produce food for the space program and develop a system to predict and prevent safety problems throughout the food preparation process.

The HACCP system consists of seven steps:

- ***Identify potentially hazardous foods.***
- ***Identify critical control points in the preparation, holding, and serving process.***
- ***Establish control procedures to monitor critical points to guarantee safe handling of food.***
- ***Establish monitoring procedures to adjust the process and maintain control.***
- ***Establish corrective actions when monitoring shows that there is a deviation from an established critical limit.***
- ***Establish effective record keeping procedures.***
- ***Develop procedures to verify that the plan is working.***

Food service design can contribute to the control of potentially hazardous food by providing the proper equipment at the proper location for preparing and serving food. This begins at the receiving dock and continues throughout the operation.

At the receiving location, provide sufficient space to check perishable items quickly and move them to refrigeration. Ambient storerooms should be climate controlled to reduce deterioration of food. Refrigeration must be adequate to permit the movement of air around the products to cool them and maintain the temperature. Refrigeration is also necessary to quickly chill warm products.

In the production area, provide adequate ready refrigeration to hold the product before heating or other processing. Adequate cutting and mixing equipment is needed to quickly cut or process potentially hazardous foods in sufficient amounts to comprise a complete batch in the heating device. This prevents the temptation of having hazardous food at room temperature while cutting other food to complete the batch. In serving, hazardous food must be served quickly, or provided sufficient heated holding compartments, or refrigerated spaces.

Proper design can ensure that adequate hot and cold serving equipment is provided. Proper design will provide adequate space to refrigerate leftovers quickly, remove garbage promptly, and clean and sanitize serviceware, utensils, and equipment, adhering to HACCP.

3. Health Codes

The Maryland State Department of Health and Mental Hygiene requires that all designs for activities that sell food be reviewed by the local county or city health department. When a new or renovated facility is to be designed and built, the local health department should be contacted early in the design process. Steps in the process and requirements for approvals will be explained by the appropriate health department. The food service consultant is usually responsible for contacting the health department and obtaining approvals. If approvals are not obtained, it can delay licensing and opening of the food service program.

4. OSHA

The federal government regulates work areas and businesses in respect to safety. The Occupational Safety and Health Act (OSHA) was enacted in 1970 to protect the worker in the work place. In Maryland, the Maryland Occupational Safety and Health Administration (MOSHA) administers these requirements.

OSHA standards cover a variety of areas involving food service employees. Regulations focus on areas where employees work, the materials used by employees, and other safety issues. OSHA standards protect the employee, not the customer. Most OSHA standards cover operations, but some, which include design, are as follows:

a. ***Exits:*** OSHA standards require clearly marked exits with standards for both size and placement. They dictate the occupancy levels of rooms, based on the number of exits, available fire protection, and building construction. Specific information should be obtained from OSHA.

b. ***Hazardous Materials:*** OSHA standards cover the use of many chemicals and cleaning compounds found in school food service. These hazardous materials must be stored separately from other storage to protect contamination.

c. ***First Aid:*** Kitchens are dangerous places, where people are subject to burns and cuts, slips, and falls. OSHA requires first aid supplies be readily available to the employee. Schools with nurses satisfy the OSHA requirement of having access to medical personnel.

5. *Fire and Building Codes*

Food service facilities must be designed to comply with all local and national codes. The BOCA National Building Code, NFPA/Life Safety (National Fire Protection Association) and the NEC (National Electric Code) apply.

6. *Equipment Regulations and Codes*

Each item of equipment should comply with the latest current edition of the following standards as applicable to the manufacture, fabrication, and installation.

a. ***National Sanitation Foundation (NSF) Standards:*** Comply with NSF Standards and criteria, and provide NSF "Seal of Approval" on each manufactured item and major items of custom-fabricated work.

b. ***Underwriter's Laboratories (UL) Standards:*** For electrical components and assemblies, provide either UL labeled products or, where no labeling service is available, provide a complete index of the components used as selected from the UL "Recognized Component Index".

c. ***American National Standards Institute (ANSI) Standards:*** For gas-burning equipment, comply with ANSI Z1-Series standards. Comply with A.N.S.I. B57.1 for compressed gas cylinder connections and with applicable standards of the Compressed Gas Association for water connection air gaps and vacuum breakers.

d. ***American Gas Association (AGA):*** Gas-fired equipment shall be AGA Approved, equipped to operate on the type gas available at the job site and shall contain one-hundred percent automatic safety shut-off devices.

e. ***National Fire Protection Association (NFPA) Standards:*** Comply with NFPA Bulletin 96 for exhaust systems and with NFPA Bulletins 17 and 96 for fire extinguishing systems.

f. ***American Society of Mechanical Engineers (ASME) Code:*** Comply with ASME boiler code requirements for steam generating and steam heated equipment. Provide ASME inspection, stamps, and certification of registration with National Board.

APPENDIX
AREA GUIDELINES

The following are approximate space requirements for the five prototypical food service program designs:

	AREAS	SQUARE FOOTAGES	COMMENTS
PRODUCT IN	Loading Dock		
	Satellite Elementary School*	Not Required	* Provide vehicle loading area for meals delivery. ** When the On-Site Elementary School is also a base kitchen, provide additional area for vehicle loading and unloading for off-site food delivery.
	On-Site Elementary School**	220-250	
	On-Site Middle School	220-250	
	On-Site High School	230-260	
	High School Food Court	240-280	
	Receiving		
	Satellite Elementary School	30-40	
	On-Site Elementary School	70-80	
	On-Site Middle School	80-90	
	On-Site High School	90-110	
	High School Food Court	140-160	
STORAGE	Dry Storage		
	Satellite Elementary School	80-100	Factors affecting storage include disposables and the number of days of supply.
	On-Site Elementary School	190-210	
	On-Site Middle School	300-320	
	On-Site High School	440-460	
	High School Food Court	520-530	
	Walk-In Freezer		
	Satellite Elementary School	2 door reach-in	Number of days of supply affects freezer space needed. Consider the quantity and types of USDA donated commodities received.
	On-Site Elementary School	100-120	
	On-Site Middle School	120-140	
	On-Site High School	240-250	
	High School Food Court	250-260	

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	AREAS	SQUARE FOOTAGE	COMMENTS
STORAGE	Walk-In Refrigerator		
	Satellite Elementary School	2-2 door reach-ins	Cooler space is affected by the frequency of delivery of milk and the days of supply
	On-Site Elementary School	100-120	
	On-Site Middle School	120-140	
	On-Site High School	150-170	
	High School Food Court	160-180	
PRODUCT OUT	Preparation & Production		
	Satellite Elementary School	440-460	Production space is affected by the complexity of the menu, the degree of convenience foods used, and the amount of baking done on-site.
	On-Site Elementary School	640-660	
	On-Site Middle School	620-680	
	On-Site High School	1420-1430	
	High School Food Court	940-960	
	Serving Area		
	Satellite Elementary School	250-260	
	On-Site Elementary School	420-430	
	On-Site Middle School	640-650	
	On-Site High School	1120-1130	
	High School Food Court	1650-1670	
CLEAN - UP	Dishwashing and Potwashing		
	Satellite Elementary School	225	
	On-Site Elementary School	225	
	On-Site Middle School	260	
	On-Site High School	390	
	High School Food Court	390	
	Janitor's Closet & Soap Storage		
	Satellite Elementary School	35	
	On-Site Elementary School	35	
	On-Site Middle School	70	
	On-Site High School	70	
	High School Food Court	90	

	AREAS	SQUARE FOOTAGE	COMMENTS
OFFICE	Manager's Office		
	Satellite Elementary School On-Site Elementary School On-Site Middle School On-Site High School High School Food Court	* 100 120 140 150	* Provide desk in kitchen
	Staff Lockers and Changing Areas Staff Toilets	to be determined to be determined	These areas will vary depending upon size of staff. Provide as required.
MISCELLANEOUS	Recycling Area	to be determined	Will vary with school district
	Can Washing	to be determined	Exterior wall required. Will vary with school district.

KITCHEN NET AREA SUMMARY*

(*staff lockers, staff toilets, recycling and can washing areas not included)

STUDENT POPULATION	SCHOOL KITCHEN TYPE	LOW NET S.F.	HIGH NET S.F.	EFFICIENCY
400	Satellite Elementary School	1060	1120	.85 - 89%
700	On-Site Elementary School	1880	1980	.84 - 88%
900	On-Site Middle School	2295	2435	.80 - 84%
1400	On-Site High School	3895	3985	.84 - 86%
1500-1600	Food Court High School	4125	4225	.82 - 84%

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500 Sunnyside Boulevard
Woodbury, NY 11797
(516) 576-2360

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James R. Meyers
American Gas Association (AGA)
Arlington, Virginia

Architectural Graphic Standards
American Institute of Architects
1735 New York Avenue, NW
Washington, D.C. 20006-5292
(202) 626-7300

American National Standards Institute (ANSI)
11 West 42nd Street, 14th Floor
New York, NY 10036
(212) 642-4900

ASHRAE Handbook and Product Directory Fundamentals
American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
1791 Tullie Circle, NE
Atlanta, GA 30329
(404) 636-8400
(404) 321-5478 *fax*

American Society of Interior Designers (ASID)
608 Massachusetts Avenue, NE
Washington, D.C. 20002
(202) 546-3480

American Society of Mechanical Engineers (ASME)
1828 L Street, NW, Suite 906
Washington, DC 20006
(202) 785-3756

American Society for Testing and Materials (ASTM)
1916 Race Street
Philadelphia, PA 19103
(610) 832-9500
(215) 977-9679 *fax*

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Americans with Disabilities Act Information Office
United States Department of Justice
Civil Rights Division
P.O. Box 66738
Washington, DC 20035
(202) 514-0301

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Architectural and Transportation Barriers Compliance Board (ATBCB)
1331 F Street, NW, Suite 1000
Washington, DC 20004
(202) 272-5434

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Building Officials and Code Administrators International, Inc. (BOCA)
4051 West Flossmoor Road
Country Club Hills, IL 60478
(708) 799-2300

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601 Madison Street
Alexandria, VA 22314
(703) 684-0300

Council of Educational Facility Planner (CEFP)
641 Chatham Lane, Suite 217
Columbus, OH 43221

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Division of Health Facilities Planning
Parklawn Building, Room 17A10
5600 Fishers Lane
Rockville, MD 20857

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120 Wall Street
New York, NY 10005
(212) 248-5000
(212) 248-5017 *fax*

Institute of Electrical and Electronics Engineers (IEEE)
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08854
(800) 678-4333
(908) 562-3800
(908) 562-1571 *fax*

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Maryland State Department of Education (MSDE)
200 W. Baltimore Street
Baltimore, MD 21201
(410) 767-0100

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National Fire Protection Association (NFPA)
1 Batterymurch Park
Quincy, MA 02269
(617) 770-3000
(800) 344-3555
(617) 770-0070 *fax*

National Institute of Standards and Tehnology (NIST)
Building and Fire Research Laboratory
Building 226, Room B216
Gaithersburg, MD 20899
(301) 975-6850

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Raleigh, NC

Occupational Safety and Health Administration (OSHA)
820 1st Street, NE, Suite 440
Washington, DC 20002-1205
(202) 523-1452

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New York

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200 West Baltimore Street
Baltimore, MD 21201
(410) 767-0100

Underwriters Laboratories, Inc. (UL)
333 Pfingsten Road
Northbrook, IL 60062
(708) 272-8800, ext. 2612 or 2622
(708) 272-8129 *fax*

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